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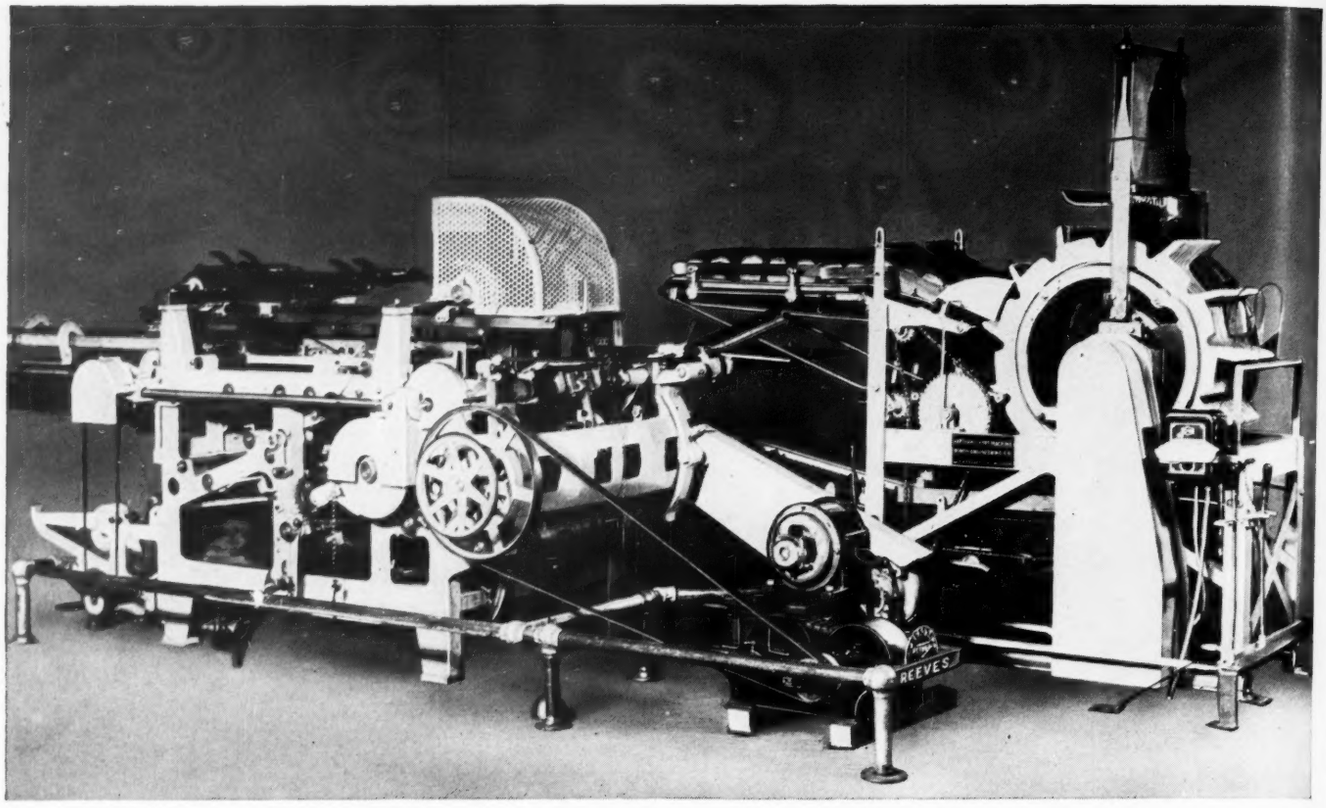

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IS AN IMPORTANT REASON FOR

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OPERATORS CAN NOW COVER MORE TERRITORY AND INCREASE BUSINESS VOLUME WITHOUT INCREASING NUMBER OF DELIVERY UNITS NEEDED

Many business men are inclined to think of truck economy in terms of gas and oil mileage. But V-8 speed also has an important effect on the economy of Ford V-8 Trucks and Commercial Cars. For example, read this letter from Chester H. Jackson, president of Standard Grocery Co.—L. A. Jackson, Inc., Indianapolis:

"Our fleet of ten Ford V-8 Trucks, servicing 150 food markets in Indianapolis, is showing such splendid results in delivery speed and low costs that we plan to open stores in many other Indiana communities. This decision results directly from the increased distances within which we can service stores from our Indianapolis warehouses. With the equipment we replaced, our operations could not economically be extended outside Indianapolis. With our 1937 Ford V-8 Trucks, distance is no handicap. In addition to their high load capacity and high performance, they are the most economical trucks we have ever owned."

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FOOD INDUSTRIES

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Established 1928—McGraw-Hill Publishing Company, Inc.

Vol. 9, No. 8

Laurence V. Burton, Editor

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AUGUST 1937

The Talk of the Industry

» STRIKES AND BATTLES for written labor contracts are typical of mankind's eternal folly of mistaking the form for the substance.

» IN OLDER DAYS there used to be a saying, "It's the rich man's war but the poor man's fight." Substitute Labor Leader for Rich Man and Workman for Poor Man—and you have a pretty fair idea of what it is all about.

» PROFESSIONAL LABOR ORGANIZERS are maneuvering to get theirs. Big jobs in labor organizations are fairly lucrative forms of livlihood. Especially when the big shots have unlimited expense accounts.

As usual, the small guy is the fall guy.

» FLAVORIZED COFFEE NOTE: A new food business is in the making. In an Eastern city is a rather successful inventor whose hobby is a trick method of reprocessing coffee to make an ordinary brand taste like the finest ever produced. Right now he is doing it for fun. His friends send him a case or two of inexpensive coffee for the flavorizing treatment, and then have something which, they say, is the equivalent of a 60-cent-a-pound coffee. An epicure of our acquaintance has sampled a brew from the flavorized coffee and pronounces it the best he has ever tasted.

One hazards a guess that when or if this inventor's hobby should become a matter of commercial development, the rivalry between the virtues of dated and vacuum packed coffee will be "something."

» SOME SO-AND-SO has grabbed the name of "Food Industries" as the appellation of a personal holding company to cut down his taxes.

Memo to legal department: Let's sue this economic royalist, if he won't give us a cut. The very idea of associating our name with anyone who would cheat the government!

» ONE OF THE PLEASANTEST experiences of this department occurred last month in a call at the New York Agricultural Experiment Station. We were asked to render our opinion on the quality of about thirty different kinds of wine which are being made experimentally.

Being somewhat inexpert on the subject and unable to form an instant judgment it was necessary to sample and (we blushingly admit) repeatedly resample the better ones.

» WHAT APPEARS TO BE the real reason why certain steel companies have refused to sign a written agreement with organized labor, though they are perfectly willing to live up to conditions, is that all written contracts between steel and C.I.O. have been made to expire simultaneously on Feb. 28, 1938. The steel companies rightfully regard such wholesale expirations on a given date as ominous signs of the real fights that will begin then.

» THOSE WHO REFUSE to sign contracts anticipate that the next move will be a general strike that will demand closed shops and the check-off. And John L. Lewis, the problem-child of the day, knows exactly how to do it.

» IF THE BLACK-CONNERY BILL now before Congress should pass substantially in its present form, it might come about alack—also alas—that labor would get exacty what it is asking for: 40 hours a week—no more. Skeptics are of the opinion that labor does not really want only 40 hours of work per week, but rather that it wants a basic 40 hour week with plenty of overtime at time and a half and double time.

» SENATOR WAGNER, he who sponsored the National Labor Relations Act for the avowed purpose of promoting industrial "peace," has re-

cently executed an about-face in a manner that would do credit to a career diplomat.

On Nov. 2, 1935, he wrote to the New York *Sun* saying that the pending Wagner Bill did not require signed contracts between unions and employers. The about-face came on June 16, 1937. On that date he wrote 2,000 words to the New York *Times*, laboriously explaining his previous letter on written contracts. His last explanatory letter contains this statement:

"But if he (the employer) announces or shows that he will not sign a written contract, even if a collective bargaining agreement should be reached, then he is not trying in good faith to reach an agreement and he is violating the National Labor Relations Act."

His "explanation" was prefaced by,—"I desire to state what my position has always been and still is."

How much more effective it would have been if the esteemed Senator had incorporated his "position" in the law when he first introduced it into Congress.

Conference on Food Technology Sept. 14-17

A CONFERENCE ON FOOD TECHNOLOGY will be held at Massachusetts Institute of Technology, Cambridge, Mass., on Sept. 14–17, 1937. A cooperative meeting of the New England branch of American Society of Refrigerating Engineers will be held at the same time. In addition to an excellent program, there are to be special discussions of canning; application of low temperatures in food handling and treatment; advances in dairy manufactures.

This conference, as far as FOOD INDUSTRIES can ascertain, will be the first one to be held in the United States on the broad aspects of the entire food industry, and will emphasize the common bonds that run through all food manufacture.

The meeting is open to food manufacturers, research workers, food officials and all who are interested in the scientific advancement of food engineering and should be widely attended.

Foreman Training

NOBODY is in a better position to improve operations and reduce labor costs than the man who is in direct charge—the foreman. Management has been realizing this for several years, but has often been at a loss to know how best to teach its foremen how to function in this direction. Motion study, work planning, rate setting and all other phases of industrial engineering all have their place, but the foreman is the chap who must get the work out.

It may interest you to know that this summer there has been a special school at Lake Placid, N. Y., to train executives on how to train their own foremen. The tuition fee was $1,000 for five weeks. The students paid $46.50 per week for living and the class was limited to 25 executives—one to a company. And the companies were carefully chosen so that no lopsidedness of interest was developed.

Though $1,000 is a good whacking sum, the results justify the expense for it is all based on the soundest of principles, that the foreman is the fellow to get things done.

Need for Wider Reading

A MARKED AVERSION to reading anything but sports news characterizes too many men in old industries like the several branches of the food industries. Here the art—the know-how—has been handed down from generation to generation as a sort of craft. To illustrate: A superintendent of a fairly large baking plant was recently heard to say, "Lissen, buddy, I *learned* my trade. I don't have to read no magazines."

This reliance on experience is nothing with which one would quarrel, for experience is a very important asset in life. Experience is really a splendid teacher. It shows how to deal with the same thing when it shows up again.

Experience often falls down as a teacher, however, when the wholly new and unexpected shows up. Then there is no precedent to go by. Under such conditions, the only thing one can do is to rely on fundamental principles and knowledge gained by

Hors d'Oeuvres

• Sound cranberries will bounce, but deteriorated or decayed ones will not, reports the Pennsylvania Department of Agriculture. So next time you buy a carload of cranberries you can amuse yourself no end, and at the same time do a job of quality control, by dropping the berries one by one on the unloading platform.

• *According to the labeling in a new set of cocktail accessories which has come on the market, a maraschino cherry is a "boulevard stop" and a stuffed olive is a "tail lite." But wouldn't it be more appropriate—well, perhaps we had better just forget the whole thing.*

• If you don't like strawberry shortcake, don't eat it. But if you do, here's a scientific excuse for gorging yourself. Fresh strawberries are among the rich sources of vitamin C.

• *Hogs in the section around Moultrie, Ga., are fed on peanuts, and produce soft pork. But the Swift branch there has brought out a "Georgia Peanut Ham" and promoted it to a nice item on the basis of its tenderness and unusual flavor. Which shows what can be done by putting a hog's best foot forward.*

• A few columns ago we reported a need for a promotion man who could sell smell to move the Limburger cheese surplus. We are happy to announce that the need has been met, not by a man but by chain stores cooperating in a nation-wide merchandising drive. How do they sell smell. Nothing to it. They merely announce in screaming streamers, "Limburger Cheese Special Today."

• *It has been discovered at Cornell University that exposure to sunlight will increase the "oxidized" flavor in pasteurized milk. Now we know why the redoubtable milkman works while the world sleeps. But it's disconcerting to romantic souls to have a scientific reason for everything.*

• The gross inefficiency in meat packing plants which results from losing the "squeal" need continue no longer. There has been devised an electronic device which utilizes squeals and squeaks to produce beautiful music. What to do with the music is the packers' problem.

• *Lion is said to be eaten by some African tribes. The Gauchos of the Banda Oriental hunt and eat the skunk. Natives of Mexico are said to eat monkey. The armadillo is regarded highly as food in South America. Roasted donkey is placed above roast horse and even roast beef by Hardy, an Englishman. The famous Bologna sausages at one time were made from the flesh of the ass.—We could keep this up for columns, but we're losing our appetite.*

study and wide reading, plus whatever principles one has been able to develop through experience. Take the C.I.O. drives as an example. What experience has anyone had with such government-aided activities prior to this year? None. Yet there is no more fundamental issue facing management in 1937 than how to handle their labor relations problems. A veritable parade of industrialists and so-called consultants has been en route to Washington for six months, so our Capital City friends tell us, seeking a short-cut to experience.

These gentlemen have all been informed, even as we, that there is no short-cut to learning. A successful handling of many current labor problems requires a training that should have begun many years ago.

It is a safe guess that there never was a time in United States history when a liberal education with its wide reading in the fields of sociology, economics and political science, had such a practical asset value as it has today. This is especially true for the company executives who must make the momentous decisions. Management is often less schooled in these subjects than are the labor organizers who pose these problems which make management lie awake nights.

Experience may be a great teacher, but a person who is also schooled in fundamental principles is more likely to cope successfully with today's problems than he who boasts he never reads. The sports pages of the daily papers offer escape from reality; they do not afford a solution to the problems of reality.

So much for experience.

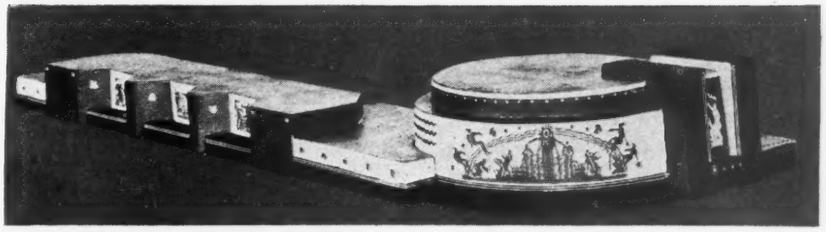
How Science May Affect the Pasteurizing Operations

At Cornell University, Dr. Paul F. Sharp has been trying to answer the very simple question of why cream rises. He has calculated that, according to Stoke's Law, it should require many days for fat particles of the size which are present in cream to rise to form a layer. But cream rises in a few minutes, so there must be a reason.

His investigations showed that there is a minute amount of some substance in whole milk which causes the fat particles to agglomerate and form clusters. These large clusters rise according to Stoke's Law. Next he and Dr. Krukovsky isolated the substance and are now trying to identify it. In general, it has the characteristics of a protein. It is easily destroyed by heat at a little above 145 deg. F., which explains why dairies find it vital to pasteurize their milk at as low a temperature as the Boards of Health will permit—usually 144 or 145 deg. F. for 30 minutes. If they go higher the cream line is destroyed, for then the cream will no longer rise quickly because the substance bringing about agglomeration has been destroyed.

If, (and this is a big if) Dr. Sharp should identify the chemical nature of the unknown substance, and later, if someone should discover how to synthesize it cheaply, there are some very interesting possibilities ahead. These speculative possibilities are our own—not Dr. Sharp's. It would then be possible to pasteurize milk at higher temperatures and for much shorter periods than now prevail, add a little of the substance and restore the cream line. In turn this would have the effect of greatly increasing the capacity of existing equipment. Under such a hypothetical condition of pasteurization, it would be a sort of cross between the "holding" method and the "flash" method.

However interesting this speculation may be, we rather suspect that it will be a long time before it becomes a technical and economic possibility, and even then there are very skeptical Boards of Health to be appeased and convinced. As a rule they do not easily embrace the addition of anything to milk—not even the adjustment of fat content to the required standard.



WORLD OF TOMORROW IN FOODS

Four buildings will house food exhibits at the New York World's Fair in 1939. One of these will contain, in addition to private exhibits, a "focal" exhibit tying in by means of a panorama or diorama the story of food with the theme of the fair, "building the world of tomorrow." A model of one of the food buildings is shown.. The dominant architectural feature of this $250,000 structure will be a circular hall 60 ft. high, broken by massive entrance pylons. The exterior will be a brilliant red, relieved by red and white murals.

Streamlining Piffle

Streamlining is a term that has a very proper use in the field of aerodynamics. Its use in describing a food, a loaf of bread or a package, or any other object that does not even faintly resemble the solution of a problem in aerodynamics is ridiculous. Most so-called streamlined packages, bottles, *et cetera,* are merely of modernistic design, some are only conservatively modern. Up to now we have never seen a truly streamlined package any more than we ever saw a truly air-conditioned pair of pajamas such as reported last summer.

Is This a Checkmate?

For many months the big question before all food manufacturers has been: what will be the future of the manufacturer's brand? Many have shrewdly surmised that the effect of the Robinson-Patman law would be to encourage distributors to bury manufacturer's brands under the counter and feature only their own private brands. Others optimistically believed the manufacturers could offset any such trend with increased sales promotion. It is becoming apparent, however, that the pessimists among the national advertisers are seeing their prognostications borne out.

Voluntary as well as corporate chains are making their policies effective. Some have discontinued stocking well known manufacturer's brands, despite consumer acceptance. Long "stop order" lists await only exhaustion of stock to become effective. Six out of seven chain units in one town attempted substitution of their own brand when a well known national brand was requested. The N. B. item was no longer stocked.

It sounds bad, very bad for national brand manufacturers. Nevertheless, for every move there is a countermove. What appears to be an effective countermove will be discussed in the September issue of Food Industries. There may be an armistice in the battle of the brands, but peace is still remote.

How to Treat WASTES

Operation of experimental plant points way to high degree of treatment at reasonable cost for cannery wastes

Settling tanks and filters at the Greenwood experimental waste-treatment plant were constructed of concrete silo blocks and reinforced with steel bands.

SUFFICIENT TREATMENT for cannery wastes is provided by fine screening and chemical precipitation, provided the plant is located on a stream which furnishes a reasonable amount of dilution water. And this type of treatment will in many cases serve as pretreatment for cannery waste being discharged into municipal sewage plants. Such a waste treatment plant with the capacity to handle a flow of 150,000 gal. per day can be built at an estimated cost of $6,200 and can be operated at a cost of about $25 a day, including power, labor, chemicals and maintenance. And smaller canneries should be able to separate various wastes within the plant and build treatment works for considerably less.

These are conclusions reached by the Bureau of Sanitary Engineering, Indiana State Board of Health, as a result of having constructed and operated for approximately 60 days an experimental cannery-waste-treatment plant at Greenwood, Ind. But other important findings were made, too. Working in cooperation with Indiana Canners' Association, the sanitary engineers learned further from their practical experience that:

(1) The practice of good housekeeping will materially affect the operation of a treatment plant. So special attention should be given to the disposal of culls, peelings, and other such refuse, especially since such waste can be disposed of with less trouble when removed at the source rather than at the screen.

(2) That properly designed and constructed fine screens are essential in the treatment of cannery waste. It is recommended that a No. 40 mesh screen, or its equivalent, be used.

(3) That small-size filter media (1 in. to 2½ in.) cannot be used in high-rate filters on cannery waste. In the operation of the experimental plant, the filter equipped with the media ranging from 2½ in. to 4 in. did not clog when operated at a high rate.

(4) The increase in efficiency of the high-rate filter when operating at a return ratio of three to one rather than one to one apparently does not justify the additional cost of this method of operation. (The return ratio is the ratio of the amount of treated sewage returned to the filters to the amount of sewage being discharged into the stream.)

The experimental plant from which this information was obtained was operated from Sept. 1 to Nov. 1, 1936. But previous to that time, studies had been made of various types of cannery-waste-treatment plants. These preliminary studies indicated that fine screening and chemical precipitation would be suitable where a reasonable amount of dilution water was available, and that other types of treatment would not be applicable to the majority of canneries in Indiana. The other systems either involved too high an initial cost, too great an operating expense, or other objectionable factors pertaining to the location of the plant and the access to streams.

Consequently, the experimental plant was designed to permit a study

Table I—Operating procedures and data on dissolved oxygen and per cent reduction in B.O.D.[1]

	Operating data [2]			Per cent reduction B.O.D., and dissolved oxygen unit												Per cent reduction thru plant
				Station No. 1			Station No. 2			Station No. 4			Station No. 5			
Date	Return ratio	Type of settling	Chemical dose	B.O.D.	% Red.	D.O.	B.O.D.	% Red.	D.O.	B.O.D.	% Red.	D.O.	B.O.D.	% Red.	D.O.	
9/22 to 9/27	3 to 1	Continuous	None	999	0	.23	759	22.8	1.75	433	42.6	2.2	395	8.8	1.55	59.5
9/28 to 10/2	3 to 1	Batch 1-hr. settling	5 lb. lime per 1,000 gal.	920	0	.06	687	24.1	.04	241	64.5	2.6	214	11.2	2.3	75.5
10/8 to 10/15	1 to 1	Batch 1-hr. settling	5 lb. lime per 1,000 gal.	1010	0	0	681	31.5	0.2	313	53.0	1.7	255	18.5	1.6	73.7
10/16 to 10/20	1 to 1	Batch 1-hr. settling	5 lb. lime 8 oz. FE_2SO_4	973	0	0	565	35.7	.63	288	55.2	1.5	205	28.8	1.2	78.6
10/21 to 10/29	1 to 1	Batch 1-hr. settling	5 lb. lime 12 oz. FE_2SO_4	754	0	.14	388	48.1	1.5	192	48.2	4.3	136	29.1	4.2	77.4

[1] The data on per cent reduction of B.O.D. and on dissolved oxygen represent averages of the daily figures.
[2] Tomato waste was handled during this experimental run. The filter rate was 30,000,000 gal. per acre (media 8 ft. deep).

[1] From a preliminary report on the operation of the experimental cannery-waste-treatment plant at Greenwood, Ind., read at the convention of Indiana Canners' Association in April.

of chemical precipitation in continuous flow and in fill-and-draw tanks, filtration at high rates with various percentages of plant effluent returned, and secondary sedimentation.

As constructed, the experimental plant included a fine mechanical screen, two primary settling tanks, two filters and a secondary settling tank, together with the necessary pumps, motors and other auxiliary equipment. In the process of treatment, the sewage passed through these various units in the order in which they have been named.

The screen, which was of the conveyor type and had 88 sq.ft. of screening area, was installed in line with and at a 45-deg. angle to the main sewer. Waste discharged from the sewer to the endless screen was held there by the flights which carry the screen. This screen, known as Audubon flexible, endless, double, metal-woven belting, had openings comparing favorably with No. 40 mesh. This screen was 2 ft. wide and 22 ft. long. To keep the screen openings clear, water or steam sprays were used. Powered with a 5-hp. motor, the screen made approximately one revolution every 50 seconds, and at this rate it handled approximately 5 gal. of waste per square foot per minute.

For settling the waste after it had passed through the screen, two primary settling tanks were constructed. These were 8 ft. in diameter and 10 ft. deep, over all, and were provided with hopper bottoms to facilitate removal of the sludge and to provide

(*Turn to page* 470)

Table II—Amounts of solids, total and suspended, present after various stages of treatment.[1]

Date	Station	Solids: Total	Solids: % reduction of unit	Solids: % reduction thru plant	Solids: Suspended	Solids: % reduction of unit	Solids: % reduction thru plant	Volatile Solids: Total	Volatile Solids: % reduction of unit	Volatile Solids: % reduction thru plant	Volatile Solids: Suspended	Volatile Solids: % reduction of unit	Volatile Solids: % reduction thru plant	pH	Alkalinity
9/22 to 9/25.....	1	2377	....	....	780	....	....	1817	....	....	530	....	....	5.8	243
	2	1808	23.9	....	165	78.9	....	1496	17.7	....	126	76.3	....	6.2	315
	4	1449	19.9	....	96	41.8	....	1137	24.0	....	85	32.6	....	6.4	353
	5	1389	4.1	41.6	75	21.9	90.5	1082	4.8	40.5	67	21.2	87.4	6.4	353
9/28 to 10/2.....	1	3519	....	....	1827	....	....	2418	....	....	1065	....	....	5.8	257
	2	1739	50.7	....	51	97.4	....	1396	40.6	....	30	97.2	....	7.9	329
	4	1381	20.3	....	77	....	....	972	31.8	....	67	....	....	7.1	385
	5	1307	5.4	62.6	66	14.3	96.5	893	8.1	63	59	12.0	94.4	7.1	509
10/8 to 10/15.....	1	3439	....	....	1374	....	....	2267	....	....	763	....	....	6.3	355
	2	2089	39.3	....	99	93.5	....	1537	32.1	....	59	92.2	....	7.4	450
	4	1641	21.3	....	122	....	....	1154	24.9	....	97	....	....	6.8	469
	5	1609	1.95	53.3	99	18.8	93.5	1002	13.1	55.8	86	11.3	88.7	6.9	475
10/16 to 10/20.....	1	2830	....	....	821	....	....	1823	....	....	335	....	....	7.4	511
	2	1894	33.1	....	67	91.7	....	1295	28.9	....	31	90.7	....	6.2	565
	4	1484	21.6	....	107	....	....	922	28.8	....	77	....	....	6.7	449
	5	1391	6.3	50.8	96	9.7	88.2	861	6.6	52.8	74	3.9	77.9	6.7	466
10/21 to 10/28.....	1	2412	....	....	697	....	....	1741	....	....	323	....	....	7.2	410
	2	1516	37.2	....	76	89.1	....	1052	38.9	....	43	86.8	....	9.0	397
	4	1233	18.7	....	107	....	....	804	23.6	....	91	....	....	7.7	415
	5	1143	7.3	52.6	67	37.4	90.7	698	13.2	59.9	57	37.4	82.4	7.6	427

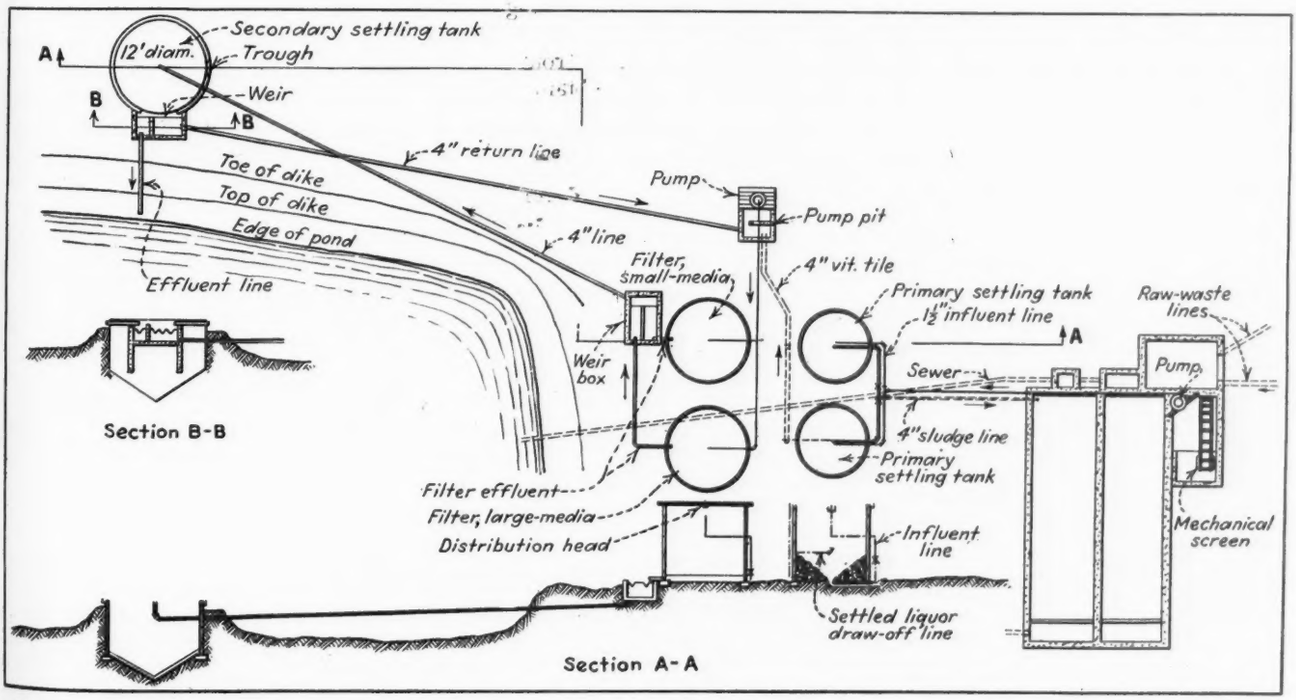
[1] The data represent averages of the daily figures. Refer to Table I for type of treatment used during the various periods for which the data are given.

Carried out for the purpose of developing for canneries a waste-treatment plant which is highly practicable both from an efficiency and a cost basis, the experimental work done by the Bureau of Sanitary Engineering, Indiana State Board of Health, in co-operation with Indiana Canners' Association, has produced worthwhile information. So the methods used and the results obtained in this experiment should be of value to operators of

Canning Factories

Quick-Freezing Plants

Other Vegetable and Fruit Processing Plants



Plan of experimental cannery-waste-treatment plant operated at Greenwood, Ind., by Bureau of Sanitary Engineering, Indiana State Board of Health in Cooperation with Indiana Canners' Association. Treatment began at the mechanical screen and continued through the primary settling tanks, the filters and the secondary settling tank.

MOSCOW No. 5

Is one of the most highly mechanized bread factories in Russia; a development of the Second Five-Year Plan

By W. W. NASHTSHOKIN
Engineer, Moscow, U.S.S.R.

In Moscow, Leningrad, and other large cities in U.S.S.R. are new central factories for turning out bread on a truly mass production scale. These factories are highly mechanized and are built around rigid circular conveyors which may be regarded as an identifying feature of Soviet Russia's Second Five-Year Plan bakery construction.

The basic principle of having a conveyor as the outstanding feature in a production line to move an object progressively in course of manufacture from one operation or processing station to another is not new in industrial plant construction. But, used in circular form in combination with central heating of ovens, the conveyor production line does represent the newest idea in bakery plant engineering. By having the production operations progress in this circular manner these bread factories approach the ideal of a fully automatic plant.

Fig. 1 shows the general layout of the factory buildings of which Moscow No. 5 is representative. This drawing also indicates the relation of the buildings to the railroad sidings serving the plant.

The factory building is divided into definitely defined sections. As marked on the Fig. 1 plan, building I is the principal circular production factory with a diameter of 92 ft., and having a height of seven stories in one part and five stories in the other. In building II is located the flour storage and handling department. The basement and ground floor levels are used for this purpose. The dining room or restaurant and the rest room for employees occupy the II(*a*) section. The railroad siding extends along the entire front of the flour department so that the flour may be delivered directly from the cars.

The shipping department is in building III which cuts into the production building I. The boiler room, IV, is in the center of the shipping department area. Three stairways lead from the non-production areas into the bread factory building.

Fig. 2 represents the diagrammatic layout of the production areas in the main factory building I. On the ground floor level are situated the flour blenders, bolting reels or sieves, small hopper bins for the blended and sieved flour and boots for the bucket elevators which lift the flour to mixing department on the top (fifth) floor of building I.

There a horizontal screw conveyor takes the flour from each of the six elevators to the automatic weigher suspended over the mixer bowl station in front of each vertical sponge and lough mixing unit, which keep each of the three circular ovens supplied with dough. An additional bucket elevator supplies flour to the rye-bread-culture fermentation department on the mezzanine floor above the regular mixing floor. For emergency use another bucket elevator carries flour to the kneading and conditioning department where the dough is given a final mixing or kneading before it is sent to the dividers and rounders.

The rye bread leaven department consists of one dough mixing unit and twenty mixing tanks or large bowls mounted on a rigid circular conveyor. This department is set up to supply the culture or leaven necessary for one large circular oven to turn out 122 tons of rye bread daily.

The main dough-mixing department is organized around three rigid circular conveyors. On the large outside circle conveyor are mounted 46 mixing bowls which move progressively to three mixers; one for mixing the sponge, one for mixing the dough, and one for kneading or conditioning the dough before it goes to the dividers. On the middle circle are 36 mixing bowls and three mixers and on the small inside circle are eighteen mixing bowls and three mixers similar to and used for the same purposes as those on the large outside circle.

The parts of these mixing circles in which fermentation of the sponge or dough takes place are in effect circular wooden tunnels. In operation the movements of each mixing bowl and its contents are as follows. At the beginning of the cycle the empty mixer bowl stands under an automatic weigher in front of the sponge mixer. Here it gets a weighed quantity of flour and, from the blending and measuring tanks on the mezzanine floor above, the required quantities of water and yeast suspension. This

bowl moves under the sponge mixer and an empty bowl takes its place at the automatic weigher station. From the sponge mixer each successive mixing bowl and sponge passes gradually through the circular fermentation tunnel to the automatic weigher station in front of the dough mixer. The distance between the sponge and dough mixers is such that the sponge is "ripe" when the station in front of the dough mixer is reached.

At this station are added the remaining ingredients: flour, salt and sugar solution, before the bowl and its contents are moved under the dough mixer. From the dough mixer the movement is through a second portion of the circular fermentation tunnel to the kneading or conditioning mixer and into the final portion of the circular fermentation tunnel.

Beside each mixing and fermenting tunnel circle and beyond the kneader-mixer are two dough dividers each hooked up to a rounder. Below the dividers and rounders is a two-cradle rigid circular conveyor——one cradle for each divider-rounder unit—which functions as the first proofer in a manner similar to the overhead proofer in the United States. The dough is dumped from the mixer-fermentation bowl into the hopper over the divider by a lift-dump which stands near the exit of the last section of the fermentation tunnel. The mixing bowl continues on its way around the circular conveyor until it reaches the station where the emptied bowls are cleaned free from pieces of the old dough and made ready for another trip around the circular production line.

From the dividers the dough lumps pass through the rounders into the loops or cradles of the circular first-proofer. After completing its circuit in this proofer each dough ball falls through a chute into the feed hopper of the molder situated on the floor below. This make-up department is indicated by the fourth level in Fig. 2.

The oven department situated on the fourth floor of building I indicated by the third level in Fig. 2 follows the same general plan as the mixing department on the floor above. It is organized around three circles; each circle consists of a circular oven above which is a circular chamber through which moves a conveyor proofer. After each dough ball falls through the chute in the floor above into the feed hopper of the molder, it is elongated, shaped into loaf form and drops onto the conveyor for final proofing before baking.

The small circular oven is placed somewhat eccentrically in relation to the other two in order to increase the distance between the small oven and the middle oven at the place where the bread is delivered from them. In fact the oven room is divided into two sections. In one section are the molders and the oven loading and unloading stations. In the other section are the ovens. The height of the oven room is cut to permit the squeezing in of the mid-floor on which are the wash room and lockers.

The molders are installed in such a manner that they can be moved about to receive the dough balls from the first proofer at various points. This is made possible because of the difference in proofing time requirements of the different types of bread before baking. This means that the cradles or loops in the first proofing conveyor have to be constructed so as to permit dumping through various chutes under their path of travel.

The large outside oven has a diameter of 84 ft. and is built to turn out 135 tons of wheat bread or 122 tons of rye bread every 24 hours. The middle oven has a diameter of 66 ft. and a production capacity of 104 tons of wheat bread, while the small oven turns out 48 tons of wheat bread in 24 hours.

All the machines and ovens are adjusted for the handling and baking of wheat bread loaves weighing from 1¾ to 2-1/5 lb. each.

From the ovens the loaves are taken by special conveyors to the point where they are loaded into circular bread coolers on the part of the third floor of the main factory building over the portion of the second floor sorting and shipping departments

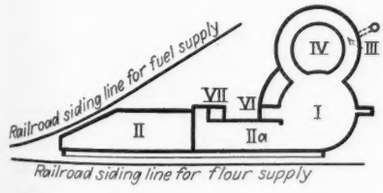


Fig. 1. Ground floor plan of Moscow No. 5.

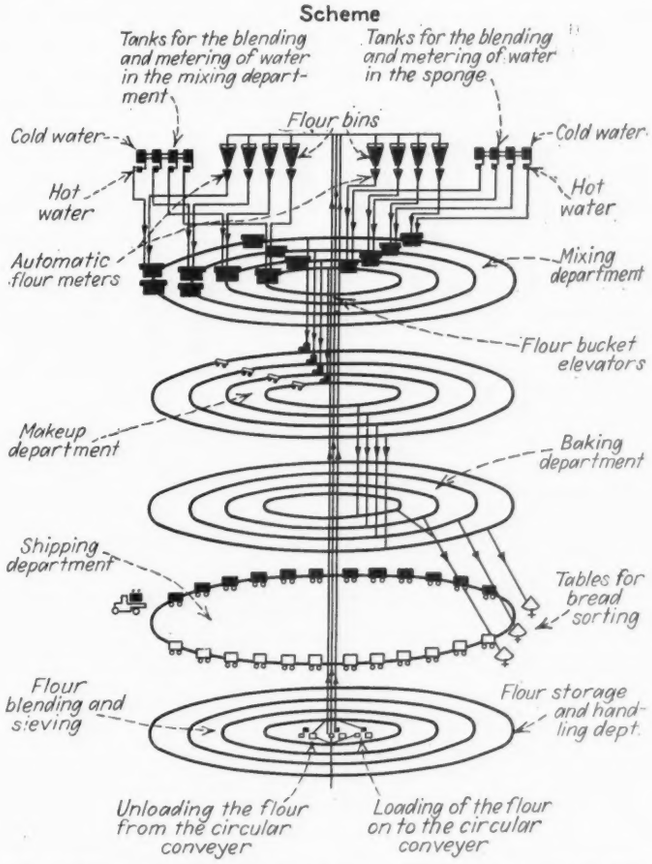

Scheme
Tanks for the blending and metering of water in the mixing department
Tanks for the blending and metering of water in the sponge
Flour bins
Cold water
Cold water
Hot water
Hot water
Automatic flour meters
Mixing department
Flour bucket elevators
Makeup department
Baking department
Shipping department
Tables for bread sorting
Flour blending and sieving
Flour storage and handling dept.
Unloading the flour from the circular conveyer
Loading of the flour on to the circular conveyer

Fig. 2. Diagrammatic layout of production area in building I of Fig. 1. These areas do not always correspond with the factory floor level. The baking department shown in this layout as being the third production level is in fact on the fourth floor of the five-story factory. Two mezzanine floors make part of the factory building I equivalent to a seven-story building.

Fig. 3. Vertical type mixers in Russian bread factories such as Moscow No. 5 are placed at stations around circles so that the mixer bowl mounted on a circular conveyor passes through fermentation tunnels as they move progressively from the sponge mixer to the dough mixer and finally to the kneader-type mixer. The mixers shown here are of the kneader type.

Fig. 4. After the mixer bowl containing the kneaded or conditioned dough passes through the last section of the fermentation tunnel a lift dump empties its contents into the feed hopper of one of two dividers at the side of and below each of the circular conveyors for the mixer bowls, or tanks as the Russians call the bowls.

which extend into building I. Also on the third floor of building I are the offices of the factory.

Actual shipping of the bread is done from a loading platform along the outer part of the circular shipping area III of Fig. 1.

As previously stated, the boiler room (IV—Fig. 1) is in the center of the shipping area. Access to, fuel handling to, and ash removal from the boiler room are through tunnels or passageways directly under the circular shipping platform.

An unusual feature in these circular bread factories of which Moscow No. 5 is representative are the oven units. Each oven unit is really of two parts: the central vertical, watertube drumless high pressure boiler and the baking chamber itself. It operates as a closed circuit without the addition of feed water to the boiler. Theoretically the saturated steam from the boiler passes through the steam piping into the tubular heating elements of the circular baking chambers where it gives up its heat of vaporization and returns to the boiler as condensate through the steam piping. The required boiler pressure is determined by the baking conditions wanted in the baking chambers. A temperature of 230 to 270 deg. C. (446 to 518 deg. F.) requires a steam temperature in the heating elements of 280 to 300 deg. C. (536 to 572 deg. F.) which corresponds to a steam pressure of about 90 atmospheres (1,300 lb. per sq.in.).

Each oven chamber is served by a separate boiler. In conformity with the heating surfaces in the baking chambers each boiler consists of a different number of banks. Each bank is made up of 22 32/20mm. diameter boiler tubes. The ends of these tubes are welded to the boiler header which has a 100/60mm. diameter. Generally each boiler is subdivided into several groups of which each group works independently as a separate boiler serving a definite bank and a definite group of baking chamber heating elements.

THE ONLY CONTROL INSTRUMENT on the boilers is a manometer; one for each group. All boilers are equipped with cold blast furnaces of the semi-shaft type with inclined stepped grates designed for burning Moscow Basin coal. Coal handling and ash removal are accomplished by a rigid circular conveyor.

In the second flue behind each boiler are installed water heaters for the hot water supply of the factory. These heaters have no connection with the oven heating system.

The ovens themselves are circular in form built with iron plate walls. The iron plates are fastened by special iron construction and the space between the walls is filled with diatomaceous earth for insulation. The hearth is in the form of a rigid circular conveyor and is driven by the same motor as the conveyor in the final proofers. The baking chamber of each oven is heated by special heating elements similar to radiators made up of a score or two of seamless, thick-walled tubes on cast-iron ribs. To provide an automatic discharge for the condensate the radiators slope in two directions. The ribbed tubes slope to the center of the ring and the entire radiator-like structure slopes in the general direction of the boiler room.

From the first day of operation of Moscow No. 5, the boilers showed themselves to be very uncertain in performance. In the seven-bank boiler, the pressure in the different groups was distributed to give 100 to 110 atmospheres in the first group, 40 to 50 atmospheres in the second and 20 to 25 atmospheres in the third. Shortly after operation began the first bank in the boiler serving the large oven exploded.

Then followed a study on the causes of the explosion by the Physicotechnical Laboratory of the Research Institute of the Bread Baking Industry, which led to an investigation of several types of boiler construction and of the heat balance of the boiler plant and of the baking chamber.

The results of this investigation and study formed the basis for the safe construction of all the heating units as now used. They also showed that there are fundamental advantages in a circular factory with central heating for the bake ovens and that, in the minds of the investigators, the future developments in bread factory construction will include central heating. This conclusion is reached because central heating requires the application of modern methods of thermal engineering instead of the technical intuition now mostly followed in the designing of bake ovens in America as well as in Europe.

Cotton Seed Oil
PRESSING COSTS CUT

Cooking cottonseed meats under pressure and at increased temperatures lowers processing time and gives higher yield of oil without loss in quality *

By C. A. PERKINS and R. BROOKS TAYLOR
University of Tennessee Engineering Experiment Station, Knoxville, Tenn.

COOKING UNDER PRESSURES GREATER THAN ATMOSPHERIC and at temperatures higher than normal and with accurately controlled moisture is the latest bid to get an increased yield of oil from cottonseed.

This forward step in the processing of the cottonseed has resulted from laboratory and pilot plant researches carried on by the Engineering Experiment Station of the University of Tennessee in the course of its study of cottonseed begun in 1929.

One of the important phases of the work was particular study of the cooking process and its relation to the yield of oil, quality of oil, and quality of meal resulting therefrom. In this connection several small cookers of various types were built and tested. The most significant results obtained from these experimental tests indicated that cooking in a closed vessel under pressure and at temperatures much above those commonly used in the industry would make possible an increased yield of oil particularly if the moisture content of the meats could be kept within accurately controlled limits. However, the results of these preliminary studies were difficult to evaluate under actual conditions of oil mill operations.

To overcome this shortcoming the University constructed a special building to house a pilot plant and equipped this plant with standard equipment in order that the proposed changes in processing could be tested out on the basis of normal full-scale operation and the results correctly evaluated.

Several oil mills aided the University by either contributing or lending the necessary equipment to set up a complete press room, and the Tennessee Valley Authority loaned the specially designed experimental cooker and its fittings. The cottonseed meats with which the experiments were run were obtained from an operating oil mill. Special precautions were observed to avoid deterioration of the meats between the time they were hulled at the mill and the time of processing at the experimental plant.

The assistance of the Tennessee Valley Authority was obtained through its interest in soil conservation and the economical production of nitrogenous feeds and fertilizers in the southern area.

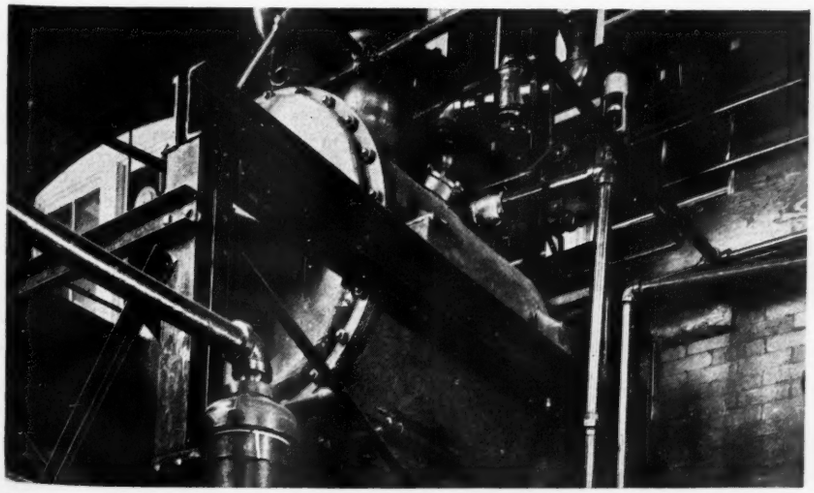
The pilot plant operated on over 275 test runs which were made under widely varying conditions of time, temperature, pressure, and moisture concentration. Chemical analyses were run on raw meats, cooked meats, pressed cake, and oil in the laboratory in accordance with the official methods of the Oil Chemists Association. These chemical control data con-

▶***Separation of a liquid fat or oil component from a fat- or oil-bearing mass by hydraulic pressing is a time-honored procedure.***

Application of heat to the mass under pressure and with controlled moisture content is a step in better engineering of edible fat or oil production.

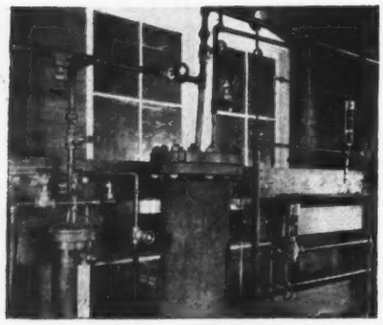
Results of studies reported in this article are worthy of study by:

Cocoa butter producers
Corn oil producers
Cottonseed processors
Meat packers
Olive oil producers
Raisin oil producers
Seasame oil producers
Soy bean processors



Cottonseed meats were cooked in a specially designed full steam-jacketed horizontal cylinder fitted with a combined mixer and agitator to give a cooking temperature of 270 deg. F. under a pressure of 25 lbs. pr sq.in. and cooking time 15 min.

* Based on report made by authors on research work done by the University of Tennessee Engineering Experiment Station with the cooperation of the Tennessee Valley Authority.



Moisture content of the meats during cooking was kept within accurately controlled limits by a simple apparatus which regulated the delivery of moisture to the meats or the extraction of moisture from the meats in the form of steam, as well as provided control of the steam to the jacket of the cooker to give desired cooking temperatures.

stitute a very important phase of the experiment. Between 2,000 and 3,000 determinations were made.

The net results to date indicate:

(a) That the cooking process is definitely a time-temperature function and that relatively modest increases in temperature permit substantial reductions in the cooking time and resulting increases in oil yield. With the pressure cooker used in these experiments, proper conditioning of the meats was accomplished at 270 deg. F., or above, in a total time of not more than fifteen minutes, as compared with normal oil mill practice of 60 to 90 minutes at 230 deg. to 290 deg. F. Processing at these temperatures, however, contemplates thorough agitation during the process.

(b) That the internal cooker pressure was a function of the cooking temperature, the moisture content of the meats, and the amount of unoccupied space in the cooker.

According to the results of these experiments, cooking temperatures of 270 deg. F. or higher, contribute toward substantial increases in oil yield. It was found possible to maintain an average "standard," (ratio of oil to ammonia in the cake), of 55 as compared with "standards" of from 65 to 70 for average oil mill practice. On a basis of "prime" seed, (3.5 per cent NH_3 and 18.5 per cent oil), ten to fifteen points reduction in the "standard" is the equivalent of from $6\frac{2}{3}$ to 10 lb. increase in oil yield per ton of seed, which is equivalent to a gain of 67 cents to $1 per ton with oil at 10 cents per lb. The quality of the cake and oil was uniformly equal to or better than the best mill practice

Equipment by means of which these pilot plant results were obtained consisted of:

(a) A five-high set of Buckeye 42x14-in. crushing rolls adjusted to give the rolled meats a thickness of between .006 and .008 in.

(b) A cooker consisting of a completely steam-jacketed horizontal cylinder fitted with steam-tight charging and discharging doors at the top center and bottom center respectively with narrow helical blades arranged inside the cooker to provide thorough agitation during the cooking period and to carry the meats out through the discharge door when it was opened at the end of the cooking period and with reducing valves to permit the delivery of steam to the jacket over a range of temperatures from 180 to 400 deg. F.

(c) A steam generator to supply a measured quantity of steam to the batch for the purpose of adding moisture to the meats. (The action of this generator was reversible. Cold water instead of steam could be admitted to the jacket of the generator and moisture from the batch could be driven over, condensed in the coils and measured in an auxiliary measuring tank. This arrangement made possible the addition or subtraction of accurately measured quantities of moisture to or from the meats).

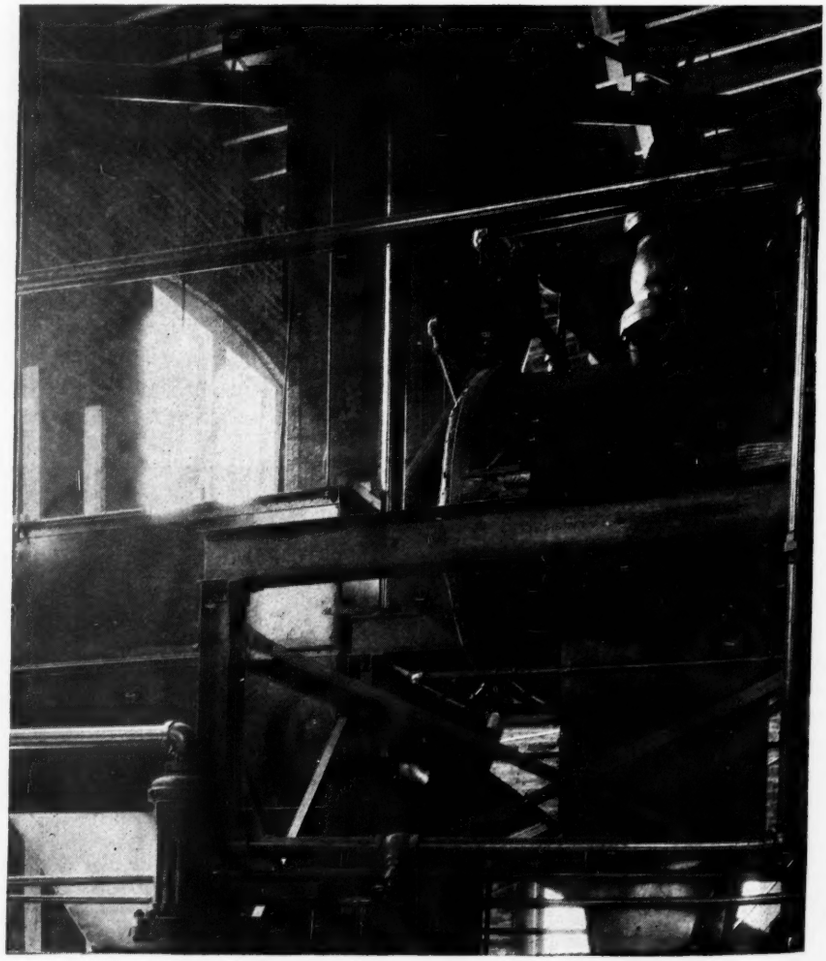
(d) A vacuum pump to make possible the holding of a vacuum on the cooking chamber when the cooking was done at very low temperature and a small condensate pump to remove condensate from the jacket of the cooker when cooking with steam at below atmospheric pressures.

(e) Gages and thermometers necessary to keep an accurate record of cooking conditions.

(f) A hydraulic former.

(g) A standard 14-in. fifteen-box press with press plates in first class mechanical condition to turn out cakes weighing slightly under 15 lb. each and with a steel barrel suspended from a scale beam at the rear of the press to weigh accurately the oil from each batch.

(h) A French hydraulic system consisting of a four-plunger combination high and low pressure pump and two 6-ton Buckeye high and low-



Charges of meats into cooker were kept on a controlled batch-weight basis with the aid of a mechanical conveying and elevating system which loaded the cooker at the top through a steam-tight valve-like door.

pressure accumulators to give a high pressure of 4,200 lb. per sq.in. and a low pressure of 500 lb. per sq.in.

(*i*) A conveying and elevating system to help keep operations on a controlled batch-weight basis by accurate weighing before loading into cooker.

(*j*) An electrical moisture determining unit.

The instrument for the rapid determination of the moisture content of the seed is a project that the University had been working on for some time. The instrument used is an adaptation of an instrument already in wide use for the determination of moisture in tobacco and similar products. It operates on the principle that the resistance of a mass of moisture-containing material to the flow of an electric current will vary with the amount of moisture present. A quantity of rolled or ground meats is placed in a small insulated cylinder and subjected to a pressure of 200 lb. per sq.in. Two copper plates in the bottom of the cylinder are separated by a gap of about $\frac{3}{16}$ in. and carry a difference in potential of 110 volts. The flow of current between the plates as measured with a milliameter is an indication of the moisture content.

Although not suitable for determining moisture below 6 per cent, this instrument makes possible the estimation of the moisture content of a sample of seed within a very few minutes as compared with several hours by the usual laboratory methods. The percentage of error was usually less than 5 per cent when compared with the standard laboratory process, and this is sufficiently accurate for the purpose for which it is intended.

Each batch was accurately weighed into the cooker. On the basis of the moisture determinations on the rolled meats checked at intervals during the day the moisture was corrected to the previously determined optimum condition for processing. The weight of the batch was calculated to make one press charge of fifteen cakes. To avoid contamination of the experimental batches floor sweepings and trimmings were not dumped into succeeding batches, but were accumulated in tubs to be run on the following morning.

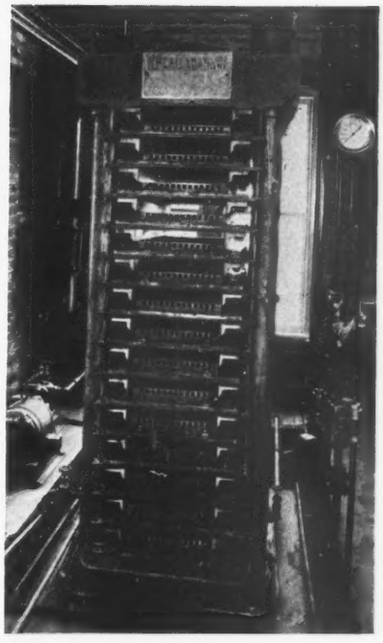
Records were kept of the cooking time, cooking temperature, internal cooker pressure, jacket pressure and of the moisture correction.

The forming and pressing procedure was in accordance with normal press room operation except that the yield of oil from each charge was accurately weighed.

The cooking tests were run at temperatures ranging from 180 to 285 deg. F. with the cooking time adjusted by trial to give thorough cooking of the meats without scorching. The time varied from one hour for the low temperature batches to seven minutes for a few of the high temperature batches.

Meats cooked at below 200 deg. F. for one hour were not thoroughly cooked. Thorough cooking was had at all temperatures above 200 deg. F. However, use of the vacuum pump and the condenser was necessary to remove the excess moisture from the batches cooked at temperatures below 220 deg. F. As the cooking temperature was increased above 200 deg. F., the cooking time was shortened correspondingly. Optimum cooking times for various temperatures were approximately 30 min. at 240 deg. F.; 25 min. at 250 deg. F.; 20 min. at 260 deg. F.; 12 to 15 min. at 270 deg. F. While batches cooked quite satisfactorily in 7 to 8 min. at from 270 to 280 deg. F., this practice did not allow sufficient time for the removal of excess moisture. Since a high moisture content in the cake results in lower oil yields, the probable optimum cooking time for this temperature range is around 10 min. When the meats are held at the correct moisture content, they appear to lose their pasty characteristics with the formation of a more porous press cake from which the oil flows quite freely. Also the press cloths strip easily from the cakes with resultant decreased wear and tear on the cloths. Thorough and complete coagulation of the proteins at the higher temperature is thought to be the explanation for this result.

Prior to cooking, the meats were rolled into flakes .006 to .008-in. thickness on a five-high set of 42x14 in. steel rolls.



After forming in the standard manner the meats were pressed on a standard fifteen-box vertical hydraulic press from which the oil of each batch flowed into a steel barrel suspended from a scale beam at the rear of the press where the resulting oil was weighed.

Cooking at the higher temperatures had no harmful effect on the oil. Along with the improvement in oil extraction with increasing cooking temperatures was the drop in the "standard" from an average of 66 for batches cooked at 230 to 235 deg. F. to an average of 54 for batches cooked at 265 to 275 deg. F. These figures are taken from analyses of the center of the cake and represent the averages for approximately 180 test runs. All other results given in the report are based on analysis of the entire cake.

Effect of moisture content of meats is shown in that the best oil yields were obtained from cooked meats with a moisture content ranging from $4\frac{1}{2}$ to $6\frac{1}{2}$ per cent. Corresponding cake moisture content was 7 to 8 per cent. While cake moistures of 7 to 8 per cent represent optimum moisture content for best oil yields when sampling the entire cake, considerably better extraction was recorded from much drier batches when sampling was done on the center of the cake. Several batches were recorded with "standards" of 40 or slightly over when sampling by this method. When the ammonia content of the meats was high, it was possible to cook much drier and still maintain the required plasticity. The increased percentage of oil in the meats is thought to be the reason. Optimum moisture content in the cake was from $5\frac{1}{2}$ to $6\frac{1}{2}$

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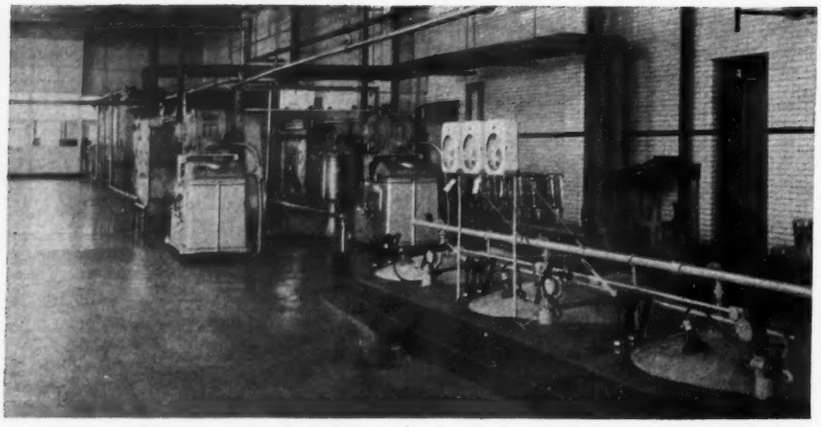

The floor and walls of this plant are so constructed and the equipment so installed as to permit maintenance of a high degree of sanitation. It is a plant of Pioneer Ice Cream Brands, New York.

Freedom from INFECTION

Requires Special Design and Handling

BY RAYMOND N. BOSTOCK
Consulting Engineer, Newark, N. J.

MOST FOODS are not sold in a sterile condition, sealed in sterile containers. Many are thoroughly infected, but are in such a condition that the growth of micro-organisms is prevented, or at least arrested. These are not proof against spoilage but will deteriorate in time. How long a time and how much deterioration depends pretty much upon the condition in which the food was packaged and, of course, the maintenance of the conditions which inhibit bacterial growth. Spoilage before processing, after processing or after sale may all occur. But even more important, though not so obvious, is a general deterioration in quality which sometimes takes place progressively at all stages up to the time of consumption.

This deterioration in quality is usually detected as off-flavor or poor flavor. If it were possible to measure flavor quantitatively, there would be by now a mass of accurate information on this subject. It is most difficult to tabulate products according to taste quality. Yet the public does notice off-flavor, if only subconsciously. If a product is consistent in its flavor, the public may be educated to accept it, as in the case of so many delicious, if ill-smelling, cheeses. But, unfortunately, off-flavor produced by the attack of micro-organisms is sporadic, and it produces a non-uniform product.

The bogey of bacterial contamination continually looms over every new and improved process which is attempted. Many improved methods might be used which prove themselves advantageous in the laboratory but that cannot even be seriously considered on a commercial scale for fear of contamination. It is taken for granted in industry that it is impossible to maintain the laboratory conditions which will make the improved process practical, so it is never attempted,

Wherever a product is handled, the types of organisms best adapted to attack the product will develop. It is possible, however, to prevent their development, and only a brief study is needed to reveal the necessary procedure — keep everything sterile.

This is the ideal: Keep everything that touches food sterile—not merely clean but sterile. This is difficult in the face of modern production requirements, sometimes impossible. High-speed production has introduced more and more automatic machinery with intricate mechanisms and parts difficult to clean, let alone to sterilize. In view of these difficulties are such heroic measures worth considering? Is it practical and will it pay?

There is no one answer to the foregoing questions, but in many cases the ideal will serve as a worthwhile goal. There is often little difference in the effort necessary to produce sterility and to produce good practical cleanliness, and we must frequently aim at the former to achieve the latter. It is sometimes practical and essential to produce sterility of equipment, and often it will pay every tangible dividends in the form of improved quality.

There is an outstanding example of this in the beverage field. By producing sterile conditions, a bottler was able to market a product never before sold. The product contained a very perishable fruit juice which, when pasteurized in the bottle, changed in character to such an extent that it was not very palatable. The alternative was sterile bottling, and this in turn meant sterile handling. This was a paying and commercially successful procedure. It was not accomplished by the use of any patent bactericide, but rather by application to every detail of the bacteriologist's ideal of cleanliness.

What is the initial step in establishing sterility? The room or building in which the work is to be car-

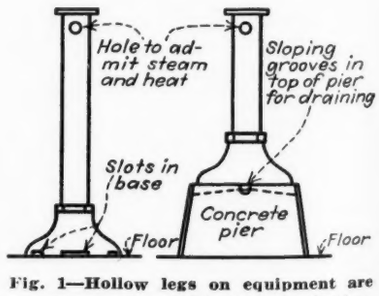

Fig. 1—Hollow legs on equipment are a common source of bacterial infection. Here are two ways to avoid this trouble.

ried out must receive first attention. It is quite impossible to maintain either food or equipment free from infection in a room which is thoroughly infected. The room must be designed to permit sterilizing of all surfaces, and must be maintained in sterile condition. If an infection is allowed to start in the room, or even in the building, the truly sterile equipment will continually become reinfected.

Floors must be smooth and hard, and they should be equipped with plenty of drains to facilitate washing. Walls and ceilings must be smooth, and covered with a glossy paint to fill all pores and make washing easy. Rooms must be well lighted and well ventilated. If the product is to be actually exposed, the use of air conditioning is certainly indicated. This will maintain a temperature and humidity disadvantageous to the growth of organisms, and in addition will supply air that is nearly sterile to the rooms. An extremely satisfactory way to use

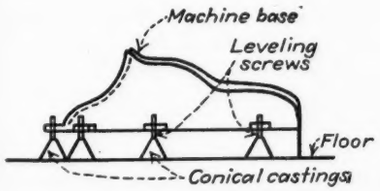

Fig. 2—Food becomes filth under machine bases and will also be a source of infection unless it is possible to clean under the machines. Here is how machines can be arranged to permit cleaning.

such air is to introduce it at the floor and exhaust it at the ceiling, thus causing a gentle upward current. Then if any organisms are picked up, they will be carried away from the product and will have little chance to settle.

Proper humidity and temperature depend on the individual case and the product to be handled, but in controlling humidity two things must be kept in mind. A very low humidity is conducive to the formation of dust, and dust is the best bacteria and spore carrier. While a very high humidity is a favorable condition for mold formation, especially if any condensation takes place. In some processes a high temperature must be maintained. In this case other precautions must be taken against the growth of molds. Chief among these precautions are the prevention of condensation and the elimination of substances which are nutrients for molds.

In older plants with wood floors and porous walls, changes have to be made. Any surface not capable of complete scouring and sterilization must be eliminated. Cracks in concrete floors and cracks in paving must be done away with, and where expansion joints are necessary some plastic material must be used to fill

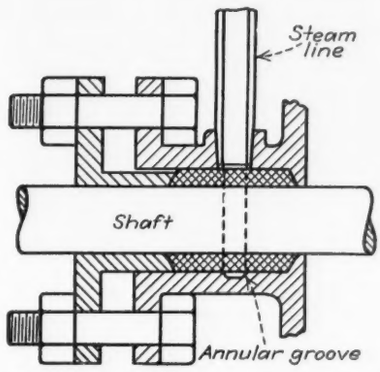

Fig. 3—Steam line to stuffing box on a rotary or centrifugal pump permits sterilizing of the packing before and after operation.

them. Colonies of micro-organisms which form in floor cracks cannot be perfectly sterilized. They are sometimes the cause of an unpleasant odor, and are a continual source of reinfection.

An ideal room would be a large glass tank with rounded corners. But as this cannot be had, a room with hard, smooth surfaces ought to be provided, and all surfaces should be such that everything can be washed down with a hose or sterilizing solution.

Having provided proper conditions in the building the next objective is sterile machinery. And here the real trouble begins. The machines necessarily rest on legs or some suitable means of support, and these supports are a most common source of plant infection. If they could be placed in some plastic material which would positively prevent moisture from getting under them, the result would be satisfactory. Sometimes cement grout is used, but more frequently nothing at all. These legs, or bases, do not make contact with the floor at every point, with the result that spilled products may run underneath where they cannot be washed out, and the putrefying bacteria start to work and multiply. This can be overcome by sealing the bases or by making it possible to

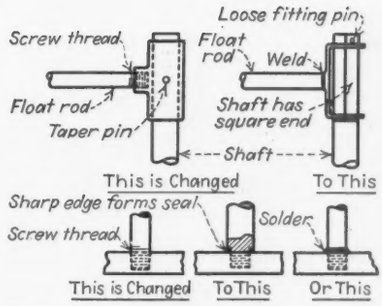

Fig. 4—Float rods and other mechanical details can be greatly improved to avoid pockets where bacterial contamination can take place.

wash and steam them. Two methods of handling pipe legs are shown in Fig. 1. The hole in the leg near the top is used to wash and steam out the inside of the leg and to provide some ventilation for the interior surface.

For larger machines, the situation has been successfully met by introducing small castings under the leveling screws, making it possible to wash underneath the machine (Fig. 2).

Working platforms if near the floor should be made movable to permit cleaning under them, and supports for high permanent platforms must be treated in the same manner as supports for equipment.

Pipe lines are another common offender. Too often they are run too near the floor or too near a wall. They should always be kept well clear of other surfaces so that there is ample room to clean under or behind them. Pipe coverings are frequently not sealed against moisture, and under damp conditions mold often forms.

Detail after detail might be cited, but it must suffice to say that all spaces under and around machines must be accessible for easy cleaning. As for the machines themselves, they are too often designed to facilitate cleaning inside but are extremely difficult to clean outside. Needless to say, this particularly applies to

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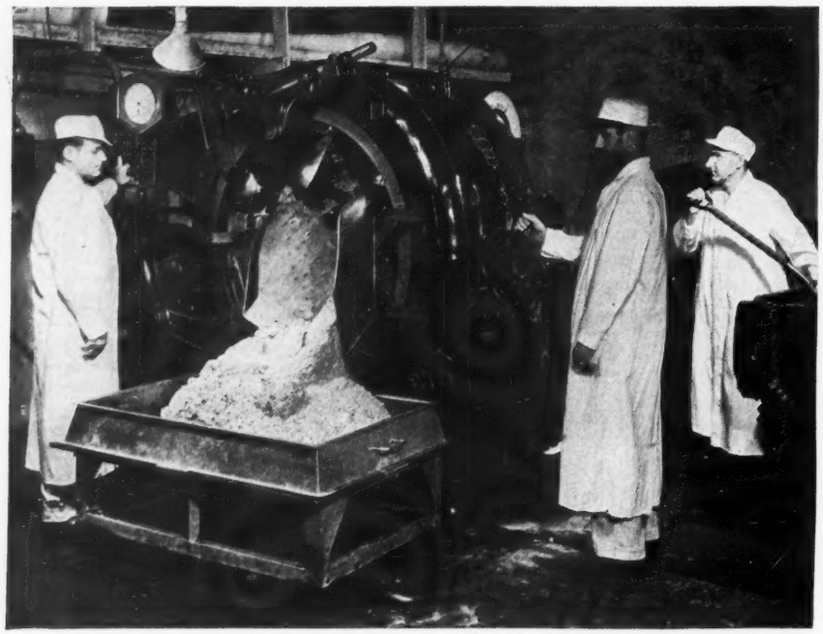
Bacterial contamination of foods is difficult to prevent during handling and processing operations in the factory. But it should be guarded against if the quality, especially flavor, is to be preserved. How to go about that is discussed in this article, which should be of interest to

All Food Manufacturers



A turn of the handwheel at the instant when the clock says the cutting is done raises a plow which discharges all the meat from the revolving cylinder into a waiting push truck. Then at the push of a button the loading conveyor raises into place, this conveyor emptying its preweighed contents into the machine as a second button is pushed. This machine is in the plant of Kingan & Co., Indianapolis.

It Cuts, It "Grinds," It Mixes

Revolutionary new machine does in one operation, at high speed, what ordinarily requires three or four processing steps

By L. V. BURTON
Editor, FOOD INDUSTRIES

A NEW PIECE OF PRODUCTION EQUIPMENT has come on the market to perform a combination of three unit operations: grinding,* chopping and mixing. Utilizing centrifugal force to hold the material in place while it is being cut, the name of this machine is the Roto-Cut. It is being put on the market by Roto-Cut Machines Corp. and is manufactured by American Laundry Machinery Co. It's one of those machines that you can look at for a long time and still not be absolutely sure of all the things it might be capable of doing.

But the fact is that the machine is a production unit of very considerable capacity. The large size will cut a 400 to 450-lb. batch of material to almost any desired degree of fineness and mix it thoroughly in periods ranging from 30 seconds up to fifteen minutes (five to eight minutes, depending on degree of fineness desired, is the time given on wet sausage by a large Midwestern packer). As soon as the mixture has the proper texture the machine can be cleanly emptied in a fraction of a minute without stopping. And then, while it is still running, another charge, already weighed out while the previous batch was being processed, can be put in, and the cycle repeated. Two men operating the machine can produce from 3,500 lb. to about 5,000 lb. of cut and mixed food in an hour. A charge of material in the machine continues to be cut finer and finer while it is in operation. Hence the machine's capacity is governed largely by the fineness of cut desired. In a product where a coarse cut is needed, the capacity will be double or quadruple the capacity where a fine cut is wanted.

After observing the Roto-Cut in operation in six plants in widely separated sections of the country, it seems justifiable to say that here is a cutting and mixing device that differs from anything previously developed. In principle it is rather singular. A 54-in. open-end drum revolves at speeds of 85 to 115 revolutions per minute on a horizontal axis. This drum is about 24 in. wide and has rims projecting inwardly toward the axis to form a "trough" and prevent any material from flying out. Sufficient centrifugal force is developed by the rotation of the drum so that material is carried around without noticeable slippage.

In the lower interior part of the drum is a movable horizontal shaft (parallel to the axis of the drum) which carries 35 knife blades for one type of sausage and 20 blades for another type, and revolves at a high

▶Since it performs in a revolutionary manner unit operations common to several food industries, the machine described in this article has many possible applications. To date it has been used to cut meat, roasted cocoa beans, spices and fruits and vegetables. Other products that may eventually be handled are coffee, cereals and fats and oils. So the capabilities of this machine ought to be known to

Meat Packers
Cocoa and Chocolate Manufacturers
Spice Manufacturers
Canners
Coffee Roasters
Cereal Processors
Fat and Oil Processors
Pickle Finishers

* Strictly speaking, the machine does not grind, but cuts. However, it does the work for which grinders are employed.

rate—2,500 r.p.m. Both drum and knives revolve in the same direction but at greatly different peripheral speeds. The knife blades are adjustable with respect to the clearance between their edges and the periphery of the drum. The blades are curved like an exaggerated saber or scimitar, the purpose of the curvature being to produce a draw cut instead of a pressure cut.

Before discussing the application of the machine to specific jobs the accessory equipment should be fully described. First of all, there is a handwheel adjustment for raising or lowering the knives while they are revolving at full speed; it is found to be the best practice to lift the knives clear of the food at the close of the cutting cycle just to be sure that the food gets thoroughly mixed before discharging. Then to supplement the normal mixing action which takes place under the knives, there are small movable plows that can be lowered into place by the throw of a lever if extra vigorous mixing is needed. In addition to the mixing plows, there is an unloading plow which is lowered by a handwheel to scoop out everything as the drum revolves. When the charge is ready to come out it is in a plastic or semi-fluid state, and the material flows down a chute into a waiting receptacle, usually a push truck. Then the machine is ready for another batch.

On the charging end are several ingenious features. A conveyor-bottom hopper, or trough, is mounted on a mechanism that faintly resembles the carriage of a disappearing field gun. And all this is carried on an indicating scale so that accurate weights for formula control or production records are easy to get. Material to be cut is loaded onto the belt in the trough and weighed by a helper. Then the operator on the other side of the machine can control the charging by means of pushbuttons. One set of buttons starts the motor that lifts the charging mechanism into place to feed into the revolving drum. The other set of buttons controls the motor which moves the white rubber belt at the bottom of the trough. As soon as the belt starts to move, foodstuff begins to feed into the machine. Where the food is in big chunks, like meat in 5 to 10-lb. pieces, the material can be fed in a little at a time or the entire load (300 or 400 lb.) can be fed in within six seconds if so desired. Ten to twenty seconds is ample time for intermittent feeding. All operations are controlled by the clock mounted on the machine, for time is an important factor. Some packers use a stop-watch for timing.

To discharge a batch of meat into the cutter, the loading conveyor raises to this position.

For really high-speed mass production, three men will be needed to operate the Roto-Cut. One man will charge the loading end, one man will operate the controls, and another will take away the cut material and bring up fresh supplies. And at top-speed operations on a short-time cut six or eight men might be required to operate the machine, three or four men weighing and loading and three or four taking the finished product away.

To drive this machine, 70 hp. is required, 10 hp. on the drum and 60 hp. on the knives. Then two small motors are used to operate the charging mechanism, one (1 hp.) to lift the conveyor and the other (½ hp.) to drive it.

In the food industries, this machine has several uses. Meat packers are using it to cut and mix the materials that go into sausage and loaf products. Experiments are under way to adapt it to grinding roasted cocoa beans and other vegetable-oil seeds as well as many dry, granular products, and it already has been used to grind spices. For grinding cocoa beans the knives are replaced with special closely set circular saws which reduce the roasted beans to a form that will flow as a liquid because of the cocoa fat. This is called nib

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While the machine is cutting one batch, another batch is being weighed out in the loading conveyor. This shows the conveyor in the lowered position.

Where Is the Super-market

Supermarkets rarely use windows for display purposes, but when they do the displays are usually super displays. Their own packages of bulk foods are a popular choice for window as well as inside selling display.

Past experience and present trends indicate how it will influence food merchandising methods.

By IVAN C. MILLER,
DISTRIBUTION EDITOR, FOOD INDUSTRIES

WHEN FIFTEEN SUPERMARKETS in competition with 2,500 other stores take $7,000,000 out of a $50,000,000 market, as their share of total food sales, it is no magician's "rabbit-in-the-hat" trick. The $7,000,000 supermarket sales are at the expense of the rest of the 2,500 stores. Opinion generally credits supermarket gains to chain store losses. Independents, however, do not join with their bitter rivals, the chains, to form associations to curb supermarket competition unless the independents themselves are severely hurt by the supermarkets. It is only necessary to discuss supermarkets with independent grocers within a supermarket's trading area to be convinced that the independent bears as much of the brunt of the invasion as does the chain store.

Chains have the advantage of covering losses in one locality by gains in another. The chains have capital and organization with which to withstand the supermarket's attack. Big institutions die slowly. The small independent, however, has little capital and scant organization resources. Once on his back, there is little hope for recovery.

During the year 1935, according to the Census of Retail Distribution, only 41 per cent of the independent grocers made gross sales above $10,000 per year, approximately 40 per cent netted less than $5,000 (see Table I). Only a scant profit margin protects more than a hundred thousand small independents from the sheriff. In 1935 the chains could have abandoned all units with annual sales volumes below $10,000 and still maintained 97 per cent of their total sales.

The chain can close unprofitable units without going out of business, but not the independent. The chain can replace weak units with supermarkets. Few independents have such alternatives. Most of the chains are already experimenting with large self-service stores (semi-supermarkets). One chain with more than 100 units has stated its intention of abandoning all small units, replacing them with large self-service stores. The graduated chain store tax in force in some states, pending in others, may compel the chains to turn to supermarkets as the one means of self preservation. Although corporate chains have contemplated changing to voluntary chains, the voluntary chain method of merchandising offers too uncertain an escape from the excessive tax. The voluntary chain may next be taxed. The sale of retail stores to managers is too near the experimental stage and offers too many unraveled complications. The supermarket pasture is greenest.

Although the supermarket's share of the country's food volume has been over-estimated, nevertheless supermarkets have taken heavy toll in communities where they are located. The 1936 "Parent-Teacher Association"

Some A & P stores provide parking space, others do not.

GOING?

Cigars, pipes and tobacco have followed men back to the grocery store.

survey of Scripps-Howard's Cincinnati *Post* indicates that eight Alver supermarkets accounted for 9½ per cent of Cincinnati's retail grocery store sales, Kroger's seven "Pay-N-Take-It" supermarkets 4.3 per cent. Together these fifteen large self-service grocery stores accounted for 13.8 per cent of Cincinnati's 1936 grocery store sales.

According to the findings of the *Post* study, the annual sales volume of one Alver supermarket approximates the annual sales volume of 25 Cincinnati Kroger units, 30 A. & P. units, 2 "Pay-N-Take-It" units, 128 voluntary chain units. Alver is opening four additional supermarkets.

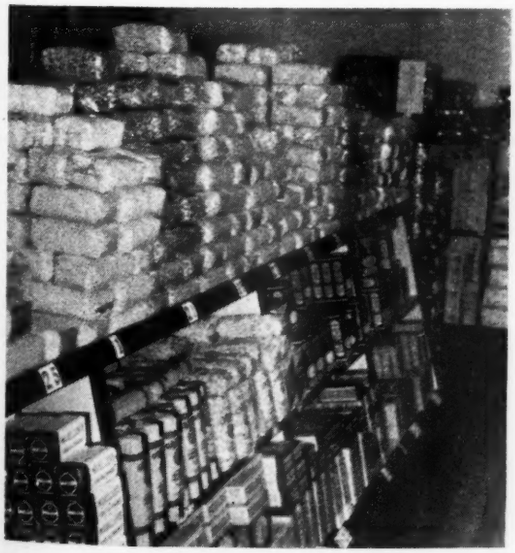
Those closely associated with supermarket operations, as well as many sideline spectators, have commented that A. & P.'s supermarket operations have not yet measured up to expectancy. During the study of supermarkets some 40 A. & P. self-service stores were visited. No two of them were alike. Some displayed an unusually large and varied range of items for an A. & P. store. Displays in other stores were almost entirely limited to A. & P.'s own brands. The size of A. & P. stores visited varied greatly, arrangement varied, method of displaying merchandise varied. Some markets provided parking space, others did not. There is less probability that A. & P. has so far made a poor showing in supermarket operation than that A. & P. is conducting a huge laboratory experiment with supermarket operation. When A. & P. has obtained all the answers A. & P. supermarkets will spring up all over A. & P. territory. Other chains will follow suit. Then there will be real competition of supermarket against supermarket and the independent will be squeezed more than ever before.

Each year has found corporate chains buying less and less from the full line wholesaler, more and more direct from the manufacturer. The fortunes of full line wholesalers have been increasingly confined to the shrinking limits of the independent field. Great inroads have been made into this field by the voluntary chains with their private labels. Some few full line wholesalers (112 according to the 1935 Census of Distribution) have benefitted by identifying themselves with voluntary organizations at the expense of remaining wholesalers. Retailers have grouped together and assumed the wholesale function, buying direct from manufacturers. The path of the grocery wholesaler, specialty broker as well as full line operator, has been down hill and far from smooth. A few wholesalers now profit from sales to supermarkets. Generally when supermarkets have warehousing facilities and the volume to justify direct buying, the wholesaler's profit becomes the supermarket's profit. Not a few wholesalers operate their own supermarkets. During the depression a few wholesalers who ventured to open supermarkets were lifted from the verge of bankruptcy to profit levels far above the rewards of wholesaling. The future will see many more wholesalers turned retailers operating supermarkets.

In 1935 only about 10 per cent of the full line wholesalers had an annual sales volume to compare with the sales volume of supermarkets: 70.1 per cent of them had sales volume less than $500,000; 47 per cent of the country's wholesalers had sales below $300,000 per year, less than the sales volume of the small self-service semi-supermarkets. (See Table II). Not only do wholesalers realize that the supermarket's volume is often

Table I—Retail Grocery and Combination Stores Grouped According to Annual Sales Volume—Year 1935

		Chains		Independents	
		Number	Per cent Total	Number	Per cent Total
Less than	$5,000	543	1.1	121,691	39.6
	$10,000	1,249	2.5	180,911	59.0
	$20,000	5,011	10.4	239,884	78.2
	$30,000	11,582	24.0	265,249	86.5
	$50,000	28,430	59.0	286,176	93.3
	$100,000	41,323	85.5	294,340	95.8
Above	$100,000	6,902		12,406	
Total		48,225		306,746	



Supermarkets buy beans, peas, dried fruit, coconut, candy and nuts in bulk and package them in retail size bags. The supermarket moves tons of bulk foods.

greater than the wholesaler's volume, but also that the supermarket's profit is far longer than the wholesaler's profit. The supermarket does business on a spread between manufacturer and consumer, with an overhead and operating cost much below that of the chain. Is it strange that wholesalers contemplate operating supermarkets? The wholesaler visualizes in supermarket operation reduced delivery, accounting and sales costs, and no credit losses.

Table II—Full Line Wholesale Grocers Grouped According to Annual Sales Volume—Year 1935

	Number	Per cent of Total
Sales below $50,000	85	2.6
100,000	325	10.1
200,000	916	28.6
300,000	1,510	47.0
500,000	2,251	70.1
Sales above 500,000	959	29.9
Total	3,210	

Food and Grocery Specialty Line Jobbers Grouped According to Annual Sales Volume—Year 1935

	Number	Per cent of Total
Sales below $50,000	4,949	49.0
100,000	6,857	67.8
200,000	8,298	82.0
300,000	8,948	88.5
500,000	9,511	94.0
Sales above 500,000	608	6.0
Total	10,119	

Wholesalers were also interviewed during the study of supermarkets. Even some wholesalers who are affiliated with voluntary chains seriously consider entering the retail field by opening supermarkets. One wholesaler now supplying stores in a voluntary group expressed tersely the sentiments of others: "With us it is a case of get in or get out." According to his admission, supermarkets in his wholesaling territory have seriously undermined the volume of the single store independents. Sales of the wholesaler's voluntary group have been stationary in an ascending market.

The supermarket movement has had a market effect on independents, chains and wholesalers. It has affected other businesses and even municipalities. When a supermarket opens on the ouskirts of a community, it is generally the beginning of a neighborhood business center. Other retailers, amusement places and service establishments move in to capitalize on the trade drawn to the supermarket. In some localities streets have been widened, surface cars removed and buses re-routed, to avoid the congestion caused by supermarket traffic.

Manufacturers, too, have been affected by the supermarket movements—those not yet affected, will be. Milk sales of a Long Island dairy selling milk in paper containers jumped up appreciably through sales to supermarkets. Supermarket customers often travel long distances to the markets and will not be bothered with the return of empties for the deposit. The supermarket method of merchandising offers advantages to some manufacturers and disadvantages to others.

THE manufacturer who sells only in bulk should benefit greatly as the result of supermarket methods of distribution. Supermarkets display large quantities of bulk foods which they themselves have packaged, such foods as beans, split peas, dried fruits, corn meal, coconut, candies and nuts. The experience of one semi-supermarket will illustrate the possibilities of bulk food sales. Bulk foods were first packaged by this market in brown paper bags. White paper bags with a transparent window throughout the length of the bag materially increased the sales of bulk food packed in them. These same foods were packaged in transparent cellulose bags and displayed side by side with identical foods in window containers. A mark-up which more than covered the cost of the transparent bags was added. Sales increased 400 per cent. Regardless of the higher mark-up, it was the transparent packs that moved. This market, one of a chain of eight stores, increased the sale of bulk foods from a few hundred pounds to more than a ton a week.

Food manufacturers who supply unbranded foods to distributors for private labeling will gain least from the supermarket movement. Quantities of packaged foods move daily to consumers under the brand name of corporate and voluntary chains, due in part to the reputation of these organizations, due to a greater extent to the sales pressure and emphasis retail employees give to the company's own brands. The supermarket employs no service clerks; stockboys in most supermarkets are forbidden to influence purchases by recommendations or suggestions.

In the supermarket the consumer is influenced only by intangibles. Aside from the influences of advertising and habit, each product creates and maintains its own market at the place of purchase. Some supermarkets display their own private labels and stress them in their own advertising, but there the pressure ends. Since the Robinson-Patman law was enacted, chains have put increased sales efforts into the selling of their own private label products. As the chains swing over to self-service, the number of items stocked will increase. Efforts to move private brands must diminish.

Many manufacturers will welcome the transition of corporate chains to self-service supermarkets. Manufac-

Manufacturers' floor displays clog the flow of traffic through the aisle. Other types of manufacturers' displays add little to a store which is all a mass display. The thousands of colorful items in the market are their own best counter displays. Posters, hanging cards and like displays have no place in the newer markets.

Many supermarkets do not have show-windows for displays, others paint them so that street traffic does not see inside the store. Window displays are rarely used by supermarkets. Customers of these markets come as the result of intention, generally from a distance. Neighborhood traffic is a small part of the market's volume. Note the man shopper, the Packard car and the uniformed chauffeur.

turers who long ago abandoned all hope of selling their products to A. & P. have lately received from A. & P. unexpected and unsolicited purchase orders. The products were ordered for A. & P. self-service markets, not the regular chain units. In Pennsylvania, as the result of the graduated chain store tax law, enacted June 1, 1937, A. & P. has already closed more than 80 outlets, in Philadelphia, in Pittsburgh and other cities throughout the state. A. & P. will close many other Pennsylvania stores which cannot show a satisfactory profit above the tax of $500 per unit. A. & P., however, will not relinquish net profits nor sales volume without a desperate struggle—$500 may be all or most of the profits of some of the smaller chain units, but $500 is only a nominal expense for a store with a $500,000 sales volume. A. & P. will continue to replace closed units with large self-service supermarkets. With independents, wholesalers and chains adopting the supermarket method of merchandising, supermarkets are assured of an important place in the food retailing of the future.

Table III—Super-market Sales by Days of the Week

40,000 sq.ft. Market

	Per cent of weeks total sales
Monday	4.5
Tuesday	4.2
Wednesday	5.9
Thursday	10.5
Friday	31.8
Saturday	43.1

5,000 sq.ft. Market

	Per cent of weeks total sales
Monday	4.2
Tuesday	6.3
Wednesday	5.3
Thursday	6.7
Friday	30.0
Saturday	47.5

NATIONALLY advertised brands have an advantage in the supermarket, because supermarkets build their following on established brands, established reputations and established prices. These prices, it is true, they have all too frequently cut ruthlessly. National brands are well represented in most supermarkets. Manufacturers' brands are plentiful. Distributor brands are not unusual. In the supermarket, every item stands on its own legs; every item has an equal display opportunity with every other item. A product moves according to its reputation, the appearance of the container and to a lesser extent the price. Appearance, package design and label are determining factors in creating sales. Push money does not move merchandise in a supermarket. Clerks do not recommend. Window and counter displays are rarely used. The sale of a product in a supermarket depends on the good will of the product, the product's appearance and the consumer. To the extent that national advertising creates good will, to that extent the national brand has the advantage over other brands in the self-service market.

The supermarket is a logical place to test new products, newly designed packages or labels, before placing the product in general distribution. New products rapidly obtain a temporary market through the self-service store, as the result of package appearance, price and local market advertising. New products obtain a permanent market if they meet the approval of consumers.

Though the supermarkets in many localities have made deep cuts into the independent's sales volume and will no doubt make even greater inroads in the future, there will, nevertheless always be a place in food retailing for the independent service store. Many of them are located beyond the reach of the supermarket. Many others can successfully meet supermarket competition. The chains, too, have felt supermarket competition, but the chains are rapidly turning to supermarket operation themselves. Voluntary units have entered the supermarket field with large self-service stores, especially on the West Coast. Only inadequate capital prevents or delays others. A few wholesalers have already made wholesaling secondary to supermarket operation, many more wholesalers will be tempted into the retail field via the supermarket. Manufacturers will find it more and more necessary to shape their merchandising policies to conform to supermarket methods of merchandising.

In formulating a merchandising plan to obtain maximum sales through the supermarket, the following factors should be carefully weighed—manufacturers should consider these facts: (1) Place-of-purchase advertising other than demonstrator promotion is considered unimportant to supermarket sales. (2) Brand acceptance, created by national and local advertising is a valuable asset in building sales volume. (3) In the self-service store a larger portion of sales are impulse sales than in any other type of store. This increases the importance of package design, package size, accurate description of package contents, label and package appearance. (4) Very important is the relative quality of the product. (5) Any manufacturer hoping to get complete supermarket distribution must meet and solve the problem of selling direct. (6) The importance of men as food buyers in self-service stores cannot be overlooked by the manufacturer who expects to reap the maximum sales of his products through the supermarket.

Ice cream vending machine collects a crowd and makes profitable sales volume in New York subway station in middle of winter.

New Machine to Extend ICE CREAM MARKET

THE FACT that ice cream melts whenever the temperature rises above a definite point has greatly limited ice cream distribution, correspondingly annual sales volume. Could ice cream be obtained wherever and whenever the desire for it arises, sales would increase measurably. A vending machine recently invented promises to make ice cream available in many new places, thereby widening ice cream's field of distribution. This machine, perfected and tested in Europe, more recently tested in Chicago and New York, vends a nickel, cardboard-wrapped 2½ oz. brick of ice cream. With the 1x2x3-in. brick is also vended a wooden or paper spoon.

The "Frost-O-Matic" vending machine requires no motive power other than that obtained from the hand lever. It is refrigerated by solid carbon dioxide and is not barred by mechanical limitations from any place where sales volume justifies installation. The machine weighs 500 lb., permits a charge of 150 bricks of ice cream and requires a maximum of 21 lb. of refrigerant per 72 hours of operation. It is uncanny in its ability to reject slugs. During a three-months' test in a New York subway station, only two slugs were collected with the $750 taken in by the machine.

The average returns from the subway station were lowest of the four locations tested. Although on exceptional days as many as 350 bricks were dispensed from a single machine, the average sale per day during the three months' test was 144 packages. Although outside temperature ranged from 15 deg. to 40 deg. below zero, 15,000 5-cent packages of ice cream were dispensed by the machine during the test period.

The results from this test were slightly lower than results from other tests. However, they represent average expectancy more accurately than results from the other tests because of the longer duration of time.

Early in the winter of 1937, with outside temperatures ranging from zero to 15 deg. below, the average daily sale from a machine in the home office of the Swift Packing Co. in Chicago was 201 bricks. In a cheap "shooting gallery" moving picture house, sales averaged 168 packages per day during a period when outside temperatures were never above freezing. This test was conducted to determine sales potentialities with a transient crowd. Few of the sales from this machine were repeats. In Chicago a machine was placed in the lobby of an office building where it was in direct competition with a lunchroom adjacent to and entered from the lobby. Sales from this machine, during a period of zero weather, averaged 145 bricks per day.

The average sale from these machines during midwinter returned better than $7 per day. Based on 80 per cent overrun, 140 2½-oz. bricks bring a gross return of $1.42 per gallon for 4.9 gal. of ice cream.

Ice Cream Vendors, Inc., which is leasing this machine in the United States and Canada, also provides for lease, insulated storage containers in which to store refrigerants and ice cream bricks. This container serves as a service station from which machines in nearby factories and office buildings may be replenished. Also provided are storage containers for trucks to service machines located on regular ice cream routes.

Factories are logical places for this type of machine. Manufacturers who have experimented by making confections available to employees, especially during certain periods of the day, have found it very profitable. In some factories it has proved advantageous to truck milk, confections, soft drinks and sandwiches about the plant within easy access of every employee. A large portion of the accidents which occur at definite hours during the day have thus been avoided. The decrease in liability insurance costs has more than paid the cost of providing employees with the opportunity to buy refreshments during working hours.

At the present time, the only application of the perfected machine is to vend ice cream in packages. New machines, however, are being adapted to the vending of quick frozen foods. The makers of this machine hope greatly to increase the number of outlets for frozen foods through its use. A technical description of the machine will be found in this issue, under "Food Equipment News."

Merchandising
HINTS AND HURDLES

National Brands vs. Consumer Groups. Since the Robertson-Patman Law ended manufacturers' allowances for local advertising, chains, both corporate and voluntary, are aggressively promoting their own private labels, in local advertising, as well as from behind the counter. National brand names appear less and less in local copy. Not only has the national advertiser lost much of the local support, but consumer bulletins and "fear books" tend to undermine the asset value of national advertisers' reputations.

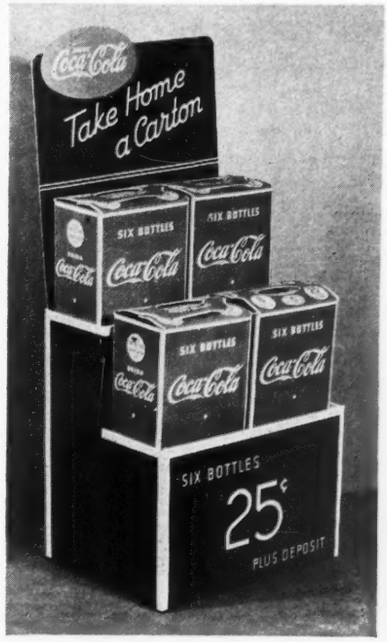
To combat public attacks from so-called consumer organizations and to assist in reinstating national brands in their former place in retail grocer advertising, the National Retail Cooperation League has been formed. The League contends that failure to advertise and support nationally advertised brands is costly to the retailer as well as to the manufacturer, and believes that facts can be used to correct the present practice of minimizing the mention of national brands in local advertising. The League expects to obtain these facts largely from studies made by Media Records. Quarterly reports of the League will list each local retail grocer's newspaper advertising, city by city, for 32 large distribution centers, show the ratio of national and private brand advertising, the proportion of linage devoted to perishables and the lines of local advertising space given to each manufacturer and his competitors. This latter information will be tabulated to show the total number of advertising lines and total number of times each brand is mentioned.

The League will hold meetings in each of the 32 cities every six months for the benefit of local advertisers, both chains and independents, and newspaper executives. At these meetings merchandising facts related to local advertising will be discussed.

The League will further undertake to counteract and offset the effect of consumer organizations and the destructive agitation of writers whose writings have been disseminated to the public through books, pamphlets, magazines and even public high school courses. The League will offer the facilities of a recognized research laboratory to make and report scientific findings on a product and determine the justness of claims made for its use.

The League proposes to distribute its own consumer reports nationally through magazines and locally through parent-teacher organizations. Addresses before meetings of retail trade associations, women's groups, business groups, and others, will be arranged by the League, which hopes in this way to place the manufacturer's story before the public and consumers. The League hopes to put into circulation consumer bulletins substantiating national brand claims to counteract consumer bulletins in circulation that attempt to destroy national brand reputations. The League further hopes to foster a national institutional advertising campaign as another means of counteracting consumer bulletin influences.

Consumer group propaganda has cast a shadow of doubt and suspicion on all food products. If the League is able to offset the spread of unjust propaganda, all food manufacturers will participate in the benefits. The League's plans involving national and private brands will be viewed with approval or disapproval according to the trade practices of each camp.



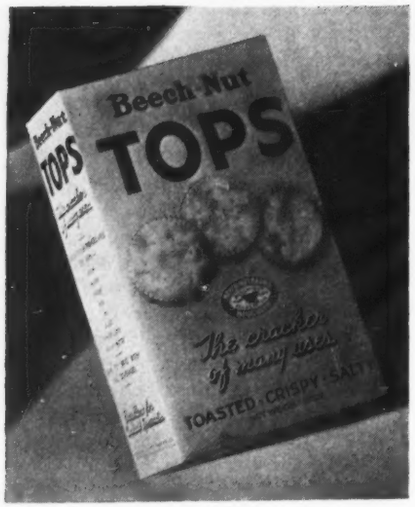
Coca-Cola packed in various containers, six bottles to the pack, has long been building sales through grocery store outlets. Coca-Cola now comes out in a new six-bottle carton and four-carton display rack; the carton top unfolds to form a carrying handle. The color effect has strong attention value.

Brand War Continues. During the convention of the National Association of Retail Grocers at Boston, June 20–24, two addresses indicate that the war between national brands and private labels is far from ended.

Paul Willis, president of A.G.M.A. said, "The discussion at our meeting also revealed that self-service stores have made great strides and that this type of store is increasing considerably in number. This group of self-service stores is of particular interest to manufacturers. Studies reveal that manufacturers' popular brands sell far more freely in this type of store where there is no clerk influence, than where there is clerk influence. The self-service type of store clearly demonstrates what Mrs. Housewife actually desires. There she obtains without resistance the popular brands which she wants, and hence she is attracted to this store and will come back for her tomorrow's order. It seems to me that dealers might well take a lesson from the fact —that their business thrives to the extent that they please their customers, and to please customers they must sell them what they want instead of selling them what the dealer feels the customer should have."

T. Blair Willison, president, Voluntary Group Institute, in his address to the convention, viewed the same subject from a different angle. He said, "During the past twelve months, the importance of the distributors' brands has continued to increase. In this year of complexities we have heard the spokesman for a powerful group of food manufacturers threaten that manufacturers would start selling direct if the distributors continued vigorously to support their own brands; yet we have seen one of the largest members of this group enter the 'private brand' field in recent months. The past year has produced an avalanche of federal and state legislation to restrict or direct or benefit various factors in the food industry. Undoubtedly most of this legislation has been at the behest of interested groups who sought it for their own particular benefit. As is usual in this type of legislation, the results do not promise to benefit those who sought it."

New PACKAGES AND PRODUCTS



Beech-Nut Introduces Tops

BEECH-NUT PACKING CO., Canajoharie, N. Y., has recently introduced a new cracker, "Tops." Distribution was obtained first in the Midwest, more recently in the East, through wagon jobbers. Merchandising effort on the new product was confined mainly to wagon banners and point-of-sale promotion by demonstrators. The dominating package color is orange-yellow, lettering deep blue.

Fluid Aspic in Cans

A PREPARED TOMATO ASPIC, fluid at normal temperature, which jells when chilled, is the product of the Sun Rayed Company, Frankfort, Ind. "Kemps Sun-Rayed Tomato Aspic" can be served as hot consomme, jellied consomme, or as an aspic jelly in salads, alone or combined with vegetables or fish.

For Cocktails and Cooking

MUTUAL CITRUS PRODUCTS COMPANY, Anaheim, Calif., has recently introduced its M. C. P. brands of natural lime and lemon juice in the Eastern market. The products, straight juice of lemon and lime, are recommended as ingredients in mixed drinks and as flavoring for cooking and baking. Recipes for mixed drinks and prepared food dishes are printed on the reverse side of the label.

D'Oursins—Snail to You

SNAIL-LIKE IN APPEARANCE but actually sea-urchins, "Supreme D'Oursins" have for years been a favorite *hors d'oeuvre* of the French. Although rich in phosphates, iodine and bromine, these delicacies have only been packed commercially a short time. The product is packed by the French colony on Saint Pierre Island and marketed in the United States by L. A. Champon, N.Y.C. Packed in glass tumblers, D'Oursins retail in this country for approximately 25 cents per oz.

Designed for Self-Service Store

GEFFEN TEA CO., Philadelphia, has repackaged its teas in paper backed metal foil satchel containers. The label printed in red and blue on metal background and the convenient handle on the package, together create a strong point of sale appeal, so necessary in the self-service store.

Meat Flavored Gelatin

A QUICK SETTING GELATIN ASPIC with a meat-like flavor, seasoned but unsweetened, is a new product of Knox Gelatin Co., Johnstown, N. Y. Royal Salad Gelatin is suggested as an ingredient in fish, meat and vegetable salads without further seasoning. Without the addition of other ingredients, this aspic chilled is suitable as a cold meat-flavored consomme. A cold tomato consomme is prepared by replac-

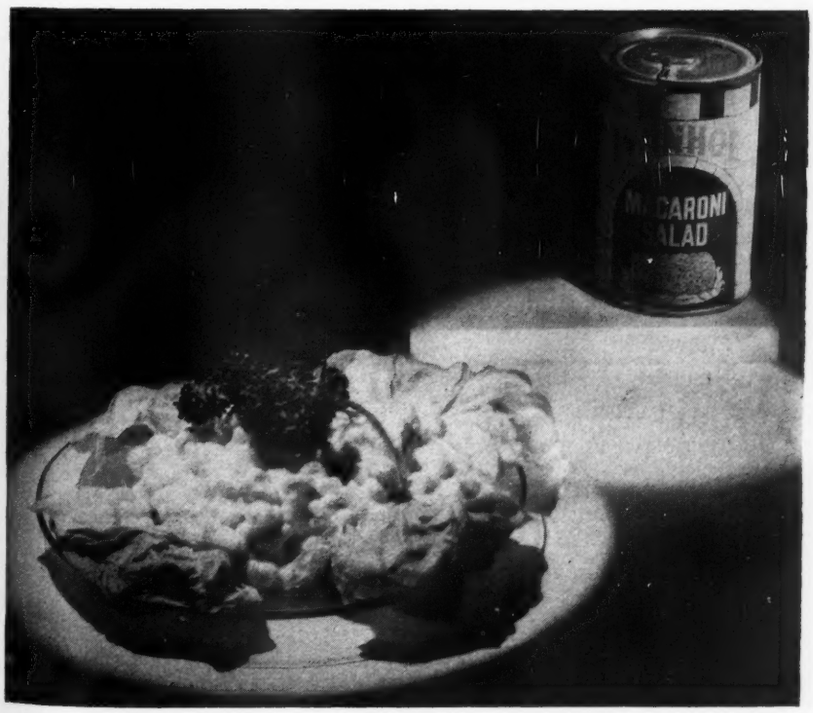
ing with tomato juice the water needed to dissolve the aspic, then chilling the mixture.

Products with Little Competition

IVANHOE FOODS Co., Auburn, N. Y., has increased plant sales volume by adding to its list of products items with no specific field of competition. Two of these products are: "Ivanhoe Potato Salad" and "Ivanhoe Macaroni Salad." Both provide a new outlet for the company's mayonnaise and salad dressing.

Handy Handle

"OH HENRY" PEANUT BUTTER, product of Williamson Candy Co., Chicago, is now packed in a container with a convenient wire handle. Priced above competing brands in one super-market, Oh Henry peanut butter packaged in this container is first in sales volume. The handy handle is probably a more important sales factor than the well-known trade name of the manufacturer.



All-Purpose Sauce

A SPAGHETTI SAUCE prepared with mushrooms is suggested by the C. H. P. Brill Co., Newark, as an all-purpose sauce to be served on fish, fowl, cutlets, meat loaf, and spaghetti. The printed label, recently redesigned, pictures various dishes which suggest the use of the all-purpose sauce. The color scheme—black and white and canary yellow.

Make the Body FIT the PURPOSE

Bananas, milk, bread, bottled beverages, and dry ice require a variety of types

BECAUSE OF THE NEED for protecting the product, bodies play an important part in the pick-up, delivery and transfer of foods by motorized equipment. Because of the high development in the technique of body building, truck bodies may now be secured to suit the particular requirements of any service that occurs in the food industries at quite reasonable cost.

Bodies used in the food field may be grouped roughly into two general classifications, refrigerated and non-refrigerated. These in turn may be subdivided into other groups, the refrigerated according to the temperature to be maintained in order to protect the food products being handled and the non-refrigerated into insulated and non-insulated.

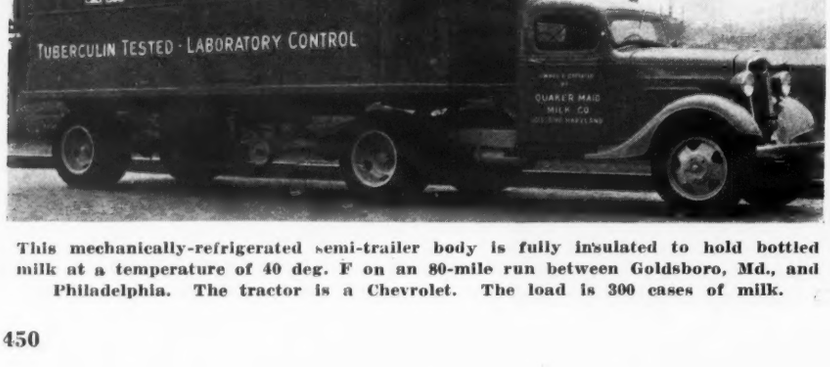
In recent years the insulated but unrefrigerated body has become extremely popular. This is because of the protection it affords the goods handled and its comparatively slight additional first cost above the conventional, uninsulated type.

When the food products handled do not remain in the truck body for long periods, as in local pick-up and delivery work, and where there is no need for low-temperature maintenance, the insulated body protects against extreme summer heat and also prevents freezing in winter. Even on moderately long haul, over-the-road movements, insulated truck and semi-trailer bodies prevent the freezing of fruit, green goods and canned foods.

Usually a double thickness floor, with or without insulation, but generally metal lined; 2 to 3 inches of some form of insulation in the side walls and ends, and from 3 to 5 inches of insulation in the roof will suffice to provide adequate protection against freezing even in the coldest weather. For low temperature maintenance, these insulation specifications are scaled upward according to the food product handled, and some form of refrigeration is provided for the body.

As an indication of present-day practice in the food field, the bodies shown in the accompanying illustrations were selected to cover a wide variety of products ranging from bananas to dry ice. The latter, while

An unusual open-in-summer and closed-in-winter body mounted on a Ford. It is used by Mercurio Bros., Detroit, for handling bananas at wholesale. The curtain is shown in its closed, or winter, position. For summer it is rolled up to provide more interior ventilation.



This mechanically-refrigerated semi-trailer body is fully insulated to hold bottled milk at a temperature of 40 deg. F on an 80-mile run between Goldsboro, Md., and Philadelphia. The tractor is a Chevrolet. The load is 300 cases of milk.

not itself a food product, is used in many bodies as a refrigerant, and presents many difficult problems in handling.

One of the accompanying views shows what is known as a Chicago type body used by Mercurio Bros., Detroit commission merchants, for delivering bananas to wholesale accounts. It is featured by a permanent, semi-insulated roof; a closed front end and a combination side consisting of upper and lower panels with open space between. In winter weather, this open space is closed by a heavy side curtain buckled in place at the front edge with leather straps and held by snappers on the bottom and rear edges. This gives practically a closed-panel job in winter to protect the bananas from freezing. In the summer, the side curtains are rolled up, providing ample ventilation of the interior.

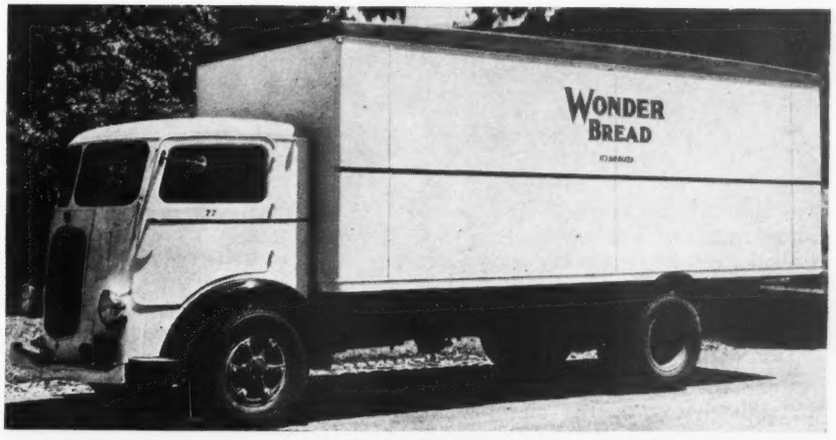
The Fruehauf semi-trailer forming part of the Quaker Maid Milk Co. tractor-trailer combination is equipped with an insulated body capable of holding bottled milk at a temperature of 40 deg. F. on an 80-mile haul between Goldsboro, Md. and Philadelphia. The insulation consists of 2 in. of Dry Zero. The body is mechanically refrigerated. It employs a York 1½-ton Freon ice machine run by a 4-hp. Briggs & Stratton motor. The load carried is 300 cases, or approximately 9 tons.

The fruit-syrup body shown is all doors on both sides, the front and rear ends being closed. The body interior is divided into three transverse sections. The two foremost sections each have two hinged doors on both sides, while the rear-section has a single hinged door on each side.

Each section has two shelves extending the full width of the body. By reason of the exceptional door facilities, the cases of syrup are easily loaded and unloaded from the sides. The driver is provided with a metal hook to pull the cases out from the center of the body. The roof is semi-insulated, and a rail around its edges permits it to be used for carrying empty syrup bottles and wooden cases back to the plant.

The Wonder Bread body illustrated is mounted on a Mack chassis and is featured by its great length, the absence of side openings and full insulation to retain as long as possible the oven heat in the load of 5,400 loaves of bread.

With both sides made up entirely of doors, this fruit-syrup body, mounted on a Mack chassis, permits rapid loading and unloading of bottles of syrup in cases. It is owned by the Consolidated Syrup Corp. and used in New York City. The body exterior is polished aluminum.



Exactly 5,400 loaves of bread may be carried in the above fully-insulated body used by the Continental Baking Co. in the San Francisco area. Absence of side openings and the use of insulation help to retain the bread's oven heat until the body is unloaded.

To speed up loading and save losses by evaporation, this Liquid Carbonic Corp. Autocar is fitted with a permanent roller conveyor on the body roof. Loading, as shown, is through three roof hatches. Delivery is made through three side doors. Full body insulation is used.

The two most important truck problems in delivering dry ice for food refrigeration are to get the ice from the storage rooms to the truck as fast as possible and to protect it from the warm air en route. To speed up loading, the truck shown herewith is provided with a permanent roller conveyor on its roof. The dry ice is loaded into the body through three roof hatches and unloaded from three side doors. The temperature of the ice as loaded is approximately 109 deg. F. below zero.

When will it be OBSOLETE?

Sooner or later all trucks reach a point where it is no longer economical to operate them

WHEN YOU ADD a new truck to your fleet, how long do you expect to operate it before replacing it with a later model? That question is important, because to get the most out of trucks and to keep distribution costs at a minimum, the old vehicles should be traded in when they have ceased to give economical service. How to determine when that time arrives is discussed below by executives who manage truck fleets in the food industries.

Uneconomical to Overhaul

We do not believe it is good policy to trade a truck in at the end of the first year. The average truck requires only minor repairs if it has been maintained with reasonable care during the year.

We believe in our business that a truck should be traded when the mileage is so great as to require major attention or complete overhauling. Although in the past we have had to take a different view on this idea, we do not believe it is economical to overhaul trucks. In our type of business we have both wholesale trucks and house-to-house trucks. The wholesale trucks, as a rule, can be reasonably maintained for five years. But in our retail business, the trucks meet much worse usage, and we believe they should be replaced in three to four years. In other words, on this basis it would not be necessary to overhaul any of the major units. Our truck fleet operates on an average of about 12,000 miles per year.

Our depreciation is set up on a yearly basis with an estimate of the miles that the truck will run in the number of years for which the depreciation is figured. We try to equalize the mileage each year on all units.

I do not believe that a truck should be depreciated in direct proportion to the mileage. This does not hold true in our business. The trucks that run the most miles as a rule are in better condition than the trucks that run fewer miles. The wholesale truck operates more miles but makes only about one-fifth of the stops and starts in a day.—D. R. BOYER, *Superintendent of Motor Vehicles, Hathaway Bakeries, Inc., Cambridge, Mass.*

Early Trade-In Costly

It is definitely not economical to trade-in a truck after the first year of operation unless such vehicle has proved itself to be of poor quality from the beginning. A vehicle is supposed to lose approximately 40 per cent of its original value during the first year. This is a conservative estimate, since trucks have very little trade-in value at any time.

Trading must be based upon time and not mileage. Depreciation charges are in practically every instance considered fixed charges, and to depreciate a vehicle on a "per mile" basis would of necessity put depreciation charges down as operating charges. To do such a thing would upset accounting records considerably.

St. Louis Dairy depreciates fully its Class I trucks in a four-year period, but in my opinion a five-year period would be more comparable to actual operations. This latter method, of course, would spread out, or amortize, the charges over a longer time. And it would consequently leave a greater margin for repair bills without increasing the total cost of operating the vehicle.

One method which may be used to determine the correct time for trading a vehicle, and one which seems very logical, is to arrive at a certain percentage which chassis- and body-repair bills should bear to the total cost of operating the vehicle. This total cost excludes depreciation charges.

It seems from our experience that the cost of chassis and body repairing should amount to approximately 21 per cent of the total cost of operating the truck, excluding depreciation charges. This percentage, of course, must be figured on a yearly, or longer, basis; shorter periods would, in most cases, make this percentage method erroneous. Whenever the chassis- and body-repair bills have greater weight than the percentage mentioned, it would apparently be wise to consider trading off the truck. At present, our depreciation is figured according to the number of years in service.

Depreciating trucks on a "per mile" basis seems a very logical method of accomplishing this end. A vehicle deteriorates very little if standing idle in a garage, but it will wear out very rapidly if it covers more than a reasonable mileage (1,800 miles per month) in a given period. Of course, it must be realized that a milk truck is constantly stopping and starting. This is very hard on any vehicle.—CLARENCE HARDY, *Truck Cost Accountant for Fleet Operation, St. Louis Dairy Co., St. Louis, Mo.*

What About Those Sales Drives?

WHAT IS THE RIGHT ATTITUDE to take when the sales department has a brainstorm and decides on a big sales drive about four months hence? Of course, everybody wants to see the goods move into consumption for every job in the plant depends on sales. On the other hand, a huge sales effort puts a big burden on the production department, a burden that sales managers seldom think about.

"Your job is to produce the goods," snorts the sales manager when the production manager tries to point out that all the profits from the proposed drive will be eaten up twice over in the cost of a lot of special new equipment which will never be used again for years or until another drive is put on. Forced draft will move a lot of goods, but forced draft is costly. Business does not grow by leaps and bounds except in very rare cases.

This question was raised not long ago by a production man who said that it was necessary to purchase 20,000 items of a special piece of small equipment in order to prepare for the sales manager's drive. Each one cost about $5. Then after the drive was over there was the problem of where to store all this new and unnecessary equipment. He had to lease outside storage space to carry it.

"As far as being an asset," he said, "they might as well be written off the books right now. They will never be used again in five or ten years unless he gets another brainstorm. And look at the interest and storage charges!

"We were knocking along at a steady rate, making pretty fair profits, until he got the wild idea that we ought to have a 'special' on one of our items. I had a nice inventory of low cost raw materials that made me feel pretty comfortable about rising cost—for a while anyway.

"Then comes this —— —— drive. We had to buy the huge lot of special equipment, and I've told you all about that. Then comes the cost of replacing our raw material inventory on today's prices.

"Man alive, I'll bet we stand to lose twice as much money over his brainstorm as he will ever dream he made on it. Squawk? Of course, I squawked. But he is a better salesman than I. He convinced the Old Man that we had to do it anyway. So, after I had my say, I got busy.

"Tell me. What do you think is the right attitude? I claim we are in business to make money—not to lose it. I want to see some more dividends on my stock—and that gentleman would make us more money by steady selling instead of having his periodic spasms."

"Isn't there any good that arises from the drives?" he was asked.

"Oh, yes. I always notice that, after a big explosion like our last one, the monthly sales of the item never subside to quite their former level. But, brother, it's going to take a long time—years—to get back the money we tied up in special equipment."

Lest You Forgot

Food manufacturers using cocoa should not select the kind they buy on a price basis. The choice ought to be expertly made to give products individuality. Information on the kinds of cocoa available and their uses is included in the article, "There Is a Cocoa for Every Use," FOOD INDUSTRIES, Sept., 1934, page 402.

Larger Machines More Efficient

An example of the benefit of asking ourselves questions about why we do our work in this way has come to light very recently in the canning and freezing of peas. A part of the operation of preparing the raw material for processing consists in putting it through a "cleaner." This is a simple device comprised of shaking screens and a fanning mill. By screening and a blast of air, extraneous material such as bits of pods, leaves, skins and splits, are to a large extent removed.

Recently several manufacturers have had occasion to enlarge their capacity and have been faced with the choice of adding more "cleaners" or using larger ones. Generally the choice has been to use one very large machine instead of several smaller ones, and the unexpected results have been that the cleaning operations have become much more effective. This in turn has reduced the need for hand-picking on the picking belts and has thus proved to be a very good investment.

As far as can be learned, there has been no effort to ascertain the cause of better work by the larger machine. Several of its features may perhaps be responsible for the better operation, such as: higher air pressures, more time permitted for it to act, different slopes of the screens, greater dispersion of raw material on the screens, different periods of oscillation, and the like.

Here is a relatively simple piece of machinery that evidently has not been previously as well developed as it could have been. Its greater efficiency in the larger sizes shows that even simple machines are capable of greater development, that nothing should be taken for granted. It is always advisable to ask ourselves, "Is this being done in the best possible manner?"

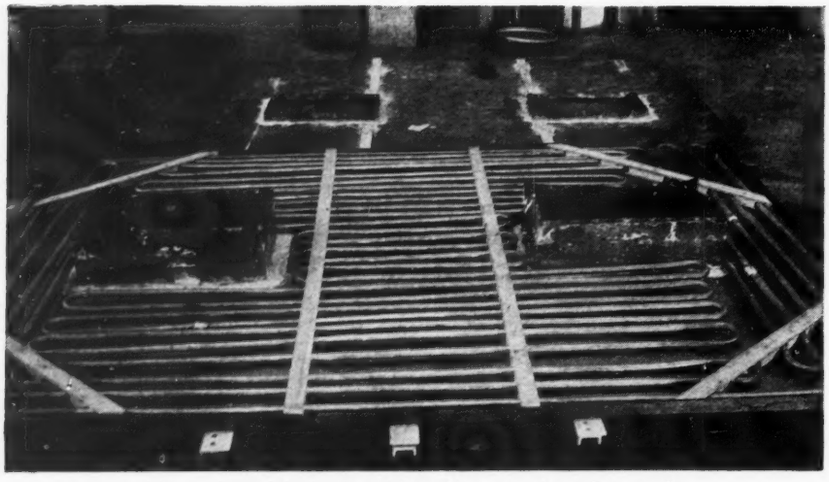
Holes in the Paddles Increased Efficiency 20 Per Cent

Worn-out bearings on the oscillating agitators in a liquid storage tank caused the production manager to ask himself—"How come?" He finally concluded that new bearings were not the permanent solution of the problem. Next the paddles on the agitator came in for scrutiny. They were large, slow-moving, stainless steel sheets about 18x12 in. He had one taken off and tried to move it by hand flatwise against the liquid, discovered the tremendous amount of force required to move it and then decided that no bearing would have enough strength to stand up under the duty unless it was many times larger.

Then he asked, "Why should such big paddles be used? Wouldn't they be just as effective stirring devices if they had big holes in the middle?" When a hole was put in one of the sheets he found that the paddle moved much more easily and agitated the fluid better.

Voila!, as they used to say in A.E.F. days. He ordered large holes cut in the middle of each paddle of every tank, and all of the worn-out bearings replaced. The pieces of equipment now work much better than ever before, the bearings never giving any trouble. And better yet, the tank can be filled considerably higher without slopping over. He figures he has increased the effective capacity of each tank by 20 per cent. All because he asked questions.

The PLANT NOTEBOOK



Jelly pad used in truck refrigeration as set up for repair.

Truck Refrigerating Pad Repair

The original steel tubing in a truck refrigerating pad was condemned because of leaks and poor condition. To get more steel tubing would have taken much time, so we decided to use copper tubes. A local plumber shaped the tubing for us, and binding strips of oak were obtained from a planing mill.

In the photograph, the two center strips are 2x2 in. drilled and then ripsawed lengthwise, in order to divide the holes in half. One-half was placed under the tubing and the other half screwed to it from the top, so that the tubing was in the holes. The corner binding strips were block spaced and screwed together.

In this condition the warmed jelly was spread in the pad, filling all crevices between wood and tubing. Next, the telescope lid was put on, being screwed fast with metal screws in the four edges and riveted to the hatch openings.

This pad is used in one of our ice cream trucks and brine from the plant system is circulated through the tubing at night, cooling the jelly to provide refrigeration for the next day.—BILLIE BURGAN, *San Diego, Calif.*

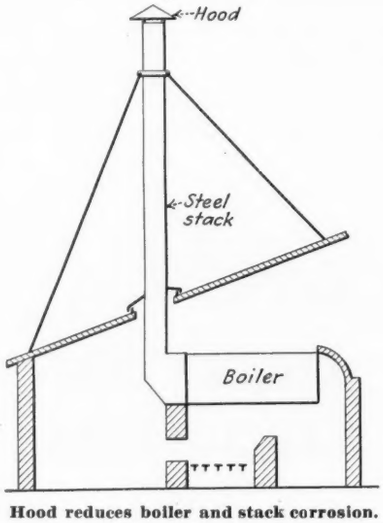
Hood Reduces Corrosion

Many food processing plants have relatively small boiler capacity and are equipped with steel stacks. These stacks are subject to both internal and external corrosion and as a usual thing must be frequently replaced at quite considerable expense. While external corrosion can be prevented by painting, internal corrosion is another problem.

As most fuels contain sulphur, the compounds from its combustion are present in the layer of soot within the stack. These compounds are inert unless they come in contact with water. If water is present, highly corrosive acids are formed and the stack deteriorates rapidly.

While the boiler is in service, the temperature of the gases in the stack is usually high enough immediately to vaporize any water which might enter its top. When the boiler is banked, or as is often found in seasonal plants, out of service for long periods of time, some method of keeping rain and snow from contact with the soot must be provided.

A hood, as shown in the sketch, serves this purpose, lengthens the time between replacements and guards against water reaching and corroding the boiler itself.—S. H. COLEMAN, *Roanoke, Va.*



Hood reduces boiler and stack corrosion.

Push Springs Used Behind Truck Door-Bolts

For convenience, some twenty door bolts are used on our trucks to latch the small compartment doors under the main deck of each truck. When they began to work too freely with use, truck vibration caused some of them to unlatch and losses were reported.

With a little experimenting, it was found that 3 in. of $\frac{3}{8}$ in. pipe, brazed to a piece of $\frac{1}{8}$ in. steel plate 2 in. square, formed an excellent shell which would hold a flexible coil spring and plunger piece when bolted to the door in line with the door bolt. A $\frac{5}{32}$ in. cotter key retained the coil spring, which was well greased with pump grease before inserting to avoid rust. The job was not costly, but provided a door-keeper that did a good paying job.—BILLIE BURGAN, *San Diego, Calif.*

Push springs behind truck door bolts stop milk and cream losses.

Electronic Can Tester

A machine using electronic control has been developed for testing cans, in order to eliminate those that might leak when filled. The use of water is avoided and no operators are required to catch leaks. It will detect very fine leaks equivalent to 1 c.c. in ten seconds under 10 lb. pressure. The design is simple, and all bearings and working parts are automatically lubricated throughout—a separate oiling device being provided to feed oil directly to the air valve, which insures the proper lubrication of this part. Turning at

8 1/3 r.p.m. the device tests about 300 cans per minute.

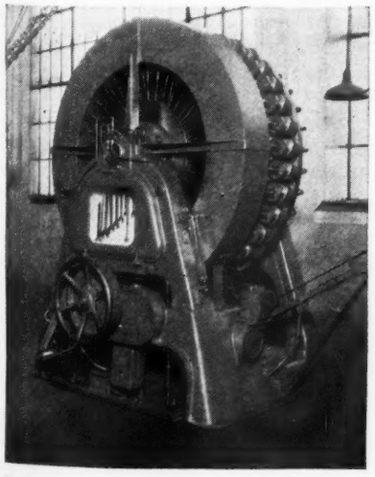
In operation, cans are conveyed by means of an adjustable chute directly into the intake turret pockets and clamped against each rubber tester head (in the large wheel) before they leave the turret pocket. This positively centers the cans in position—the outer chamber or bucket then moves forward over the can and seals itself against the rubber, creating a small air tight space around the can. By means of the air valve mechanism, air is charged into the can and the space surrounding the can (in the chamber) is caused to be normalized to atmospheric pressure. Constant air pressure in the air line, to the machine, is not essential under these conditions. Various temperatures of hot or cold cans coming into the tester do not interfere with accurate testing. There being only one detector on the machine, the setting is thereby simplified and it is unnecessary to make any further adjustment on the detector. A super-sensitive "Sylphon" makes the electric contacts, obviating the necessity of setting the contacts to extremely close limits. The machine will function perfectly even though the gap is $\frac{1}{16}$ in. wide.

A feature is that the electric detecting means are the reverse of all other testers; that is, instead of making contact when a leak occurs, this mechanism breaks contact. Consequently, if anything goes wrong with the detecting mechanism or electric power supply, all cans are immediately thrown out of the "bad" chute. Another feature is the floating, self-adjusting type outer chamber which has several advantages. Should a jam occur, that is to say, a can get smashed between the bucket and rubber, a take-up device is provided which allows the can to be crushed, but does not stop the machine, nor does it damage the bucket. After passing the outlet side of the tester, the bucket is self registering and is ready to receive the new can. When making an adjustment for tightening the can it will not be necessary to check over the outer bucket, because a $\frac{1}{2}$ in. over-travel is provided to accommodate this condition. In other words, no matter how loose or tight the can is adjusted in the tester, the outer chamber is always air tight.

In actual testing, the cans are separated by means of an intake turret. They are then clamped and located against a rubber head and the outer chamber closes. The can is then charged with air, the chamber is normalized and time is allowed for accumulation of air from leaking cans (testing time), passing of detector port in valve, registering of good and leaky cans and separating of good and bad cans.

The detector registers the increased air pressure around the can and breaks the electric contacts. Then the microtroller set registers and breaks contact with the solenoid, the solenoid registers pins to proper timing for pushing cans into inner pockets of discharge turret, and bad cans are elevated to upper chute. To check the machine for tight chambers a small petcock is turned and by inching the machine through the job bottom signal lights go on and off showing every pocket is tight.

The electrical equipment consists of a 2-hp. gearmotor of 437-r.p.m. take-off speed which is connected through gear reductions to drive the wheel at the proper speed.—CLARENCE C. BAWDEN, *Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.*



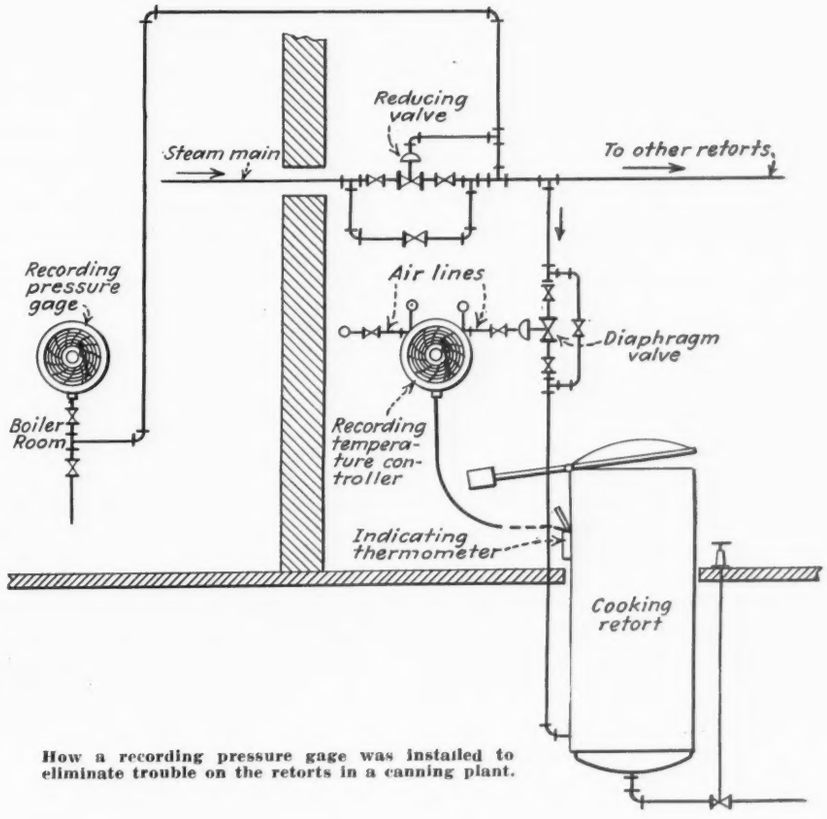
Precision electronic control detects leaks equivalent to 1 c.c. in ten seconds under 10 lb. pressure in this 300-a-minute can tester. A 2-hp., 437-r.p.m. gearmotor drives the machine at 8⅓ r.p.m.

Recording Pressure Gage Eliminates Process Troubles

Recording pressure, temperature and flow metering instruments and controllers are fast smoothing out the hit or miss processing so common in the past. Their installation results in improved quality, economy, and increased production. When they fail, the human factor is usually responsible, either through negligence, poor maintenance or misinterpretation of results. For this reason, some method of checking both instruments and personnel is advisable.

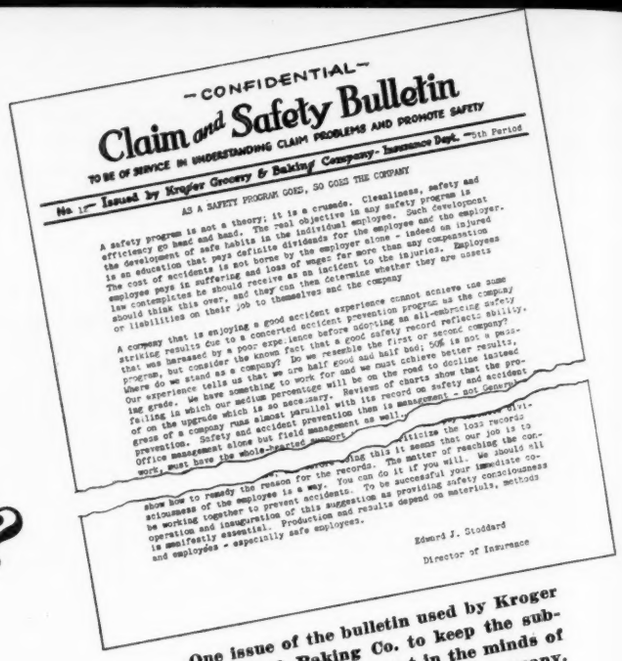
As an example of checking instruments, an indicating thermometer should be permanently installed so that a continued check on a recorder is available.

Checking personnel is another matter. For instance, in a large canning plant the man in charge of the cooking retorts always blamed fluctuating steam pressure when called on the carpet to explain erratic temperatures recorded on the charts of the retort temperature controllers. The management accepted his explanation, and it was only after the chief engineer installed a recording pressure gage on the low pressure steam line as shown in the sketch that the trouble was found to be improper operation of the retorts and not steam pressure variations.—S. H. COLEMAN, *Roanoke, Va.*



How a recording pressure gage was installed to eliminate trouble on the retorts in a canning plant.

How can ACCIDENTS be prevented?



—CONFIDENTIAL—

Claim and Safety Bulletin

TO BE OF SERVICE IN UNDERSTANDING CLAIM PROBLEMS AND PROMOTE SAFETY

No. 1— Issued by Kroger Grocery & Baking Company - Insurance Dept. — 5th Period

AS A SAFETY PROGRAM GOES, SO GOES THE COMPANY

A safety program is not a theory; it is a crusade. Cleanliness, safety and efficiency go hand and hand. The real objective is any safety program is the development of safe habits in the individual employee. Such development is an education that pays definite dividends for the employee alone - indeed on injured The cost of accidents is not borne by the employer alone - indeed on injured employee pays in suffering and loss of wages far more than any compensation law contemplates he should receive as an incident to the injuries. Employees should think this over, and they can then determine whether they are assets or liabilities on their job to themselves and the company

A company that is enjoying a good accident experience cannot achieve the same striking results due to a concerted accident prevention program as the company that was harassed by a poor experience before adopting an all-embracing safety program, but consider the known fact that a good safety record reflects ability. Where do we stand as a company? Do we resemble the first or second company? Our experience tells us that we are half good and half bad; 50% is not a passing grade. We have something to work for and we must achieve better results, of on the upgrade which is so necessary. Reviews of charts show that the prosgress of a company runs almost parallel with its record on safety and accident prevention. Safety and accident prevention then is management - not General Office management alone but field management as well.

[illegible] this it seems that our job is to show how to remedy the reason for the records. You can do it if you will. We should all be working together to prevent accidents. To be successful your immediate cooperation and inauguration of this suggestion as providing safety consciousness is manifestly essential. Production and results depend on materials, methods and employees - especially safe employees.

Edward J. Stoddard

Director of Insurance

One issue of the bulletin used by Kroger Grocery & Baking Co. to keep the subject of safety uppermost in the minds of the operating heads of the company.

INCREASED INTEREST IN SAFETY WORK is resulting through knowledge that the cost of accidents to the employing company is about four times the amount received by injured employees from the insuring companies.

Because of this fact employing companies are coming to regard money spent on safety work for the prevention of accidents as an investment instead of as an expense.

The big question is how to set up and organize a safety program which will get employee support and keep accidents to the lowest possible minimum in number as well as in amount of damage done to the employees and to plant equipment.

How some of the food manufacturing companies are solving this problem is outlined in the following letters and others to be published in the September number of FOOD INDUSTRIES.

Has a Five Year Contest

As to the success of our safety policy we need only to cite the number of accidents in our mills over a period of five years.

Based on the National Safety Council formula our lost-time accidents five years ago were averaging 22 for every million man-hours worked. At the present the lost-time accidents are averaging six for each million man-hours worked. This means that the frequency rate is now less than one-third of what it was five years ago. The severity rate has also improved 50 per cent.

Fundamentals essential to accident prevention are: (1) Correct diagnosis of the existing causes of the accidents, (2) Existence of a supervisory staff, each member of which is well informed on accident prevention and is also determined to carry through energetically an accident prevention program in all its details. It is not enough for the supervisory staff to start an accident prevention plan and then leave the running of it to the employees. The moment the key men let down on their part of the program, the number of accidents will increase.

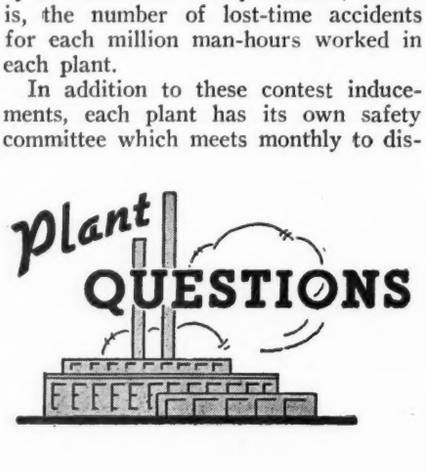
The General Mills, Inc., officials advised the plant superintendents of their responsibilities in the campaign when they announced a safety contest involving all of the company mills.

The accident prevention contest started Dec. 1, 1932, and was to run five years to end Dec. 1, 1937. The company put up two trophies; one to become the permanent property of the plant with the best rating at the close of the contest, and one to go to the plant showing the greatest improvement in accident prevention during the last half of the contest over its record for the first half.

The contest idea was so enthusiastically received by the plant personnels that divisional campaigns were started on their own initiative and in many plants departmental contests were set up along lines similar to the main contest through the representatives of the local plant personnel.

Standings of the plants in the main contest are based upon the formula used by the National Safety Council, which is, the number of lost-time accidents for each million man-hours worked in each plant.

In addition to these contest inducements, each plant has its own safety committee which meets monthly to discuss ways and means of making the plant a mechanically safer place in which to work. However, more attention is given in the safety committee meetings to the education of employees on preventing the human element type of accident. This is done because after all about 90 per cent of all industrial accidents are of this nature.



Many of our safety committees have a subcommittee whose duty is to investigate each accident and report back to the safety committee. The report contains a full description of each accident, the cause of the accident, and a suggested remedy which might avoid a recurrence of similar accidents.

Good housekeeping instruction is another activity which has been carried along in our plants as a part of the safety program.—C. E. ROBINSON, *General Mills, Inc., Minneapolis, Minn.*

Keeps Employees Safety Conscious

At the present time our method of preventing accidents is simply to provide for safety consciousness and for emphasis on such slogans as, "The Safe Way is the Right Way."

The matter of safe equipment and training is something that can very definitely be had, but safe equipment and proper training amounts to very little if employees are not safety conscious.

In the Claim and Safety Bulletin of our insurance department is discussed safety consciousness. Through this bulletin we present this subject to the operating heads of the company for use and enforcement. In this way we are trying to accomplish safety work through accident prevention and accident prevention through safety consciousness.—EDWARD J. STODDARD, *The Kroger Grocery & Baking Co., Cincinnati, Ohio.*

New DISCOVERIES AND INVENTIONS

BAKING

Swelling Behavior of Flour

SWELLING TESTS were made with different samples of flour in dilute solutions (0.01 to 1 mol per liter) of lactic, acetic and oxalic acids in water. For each test two samples (each 10 g.) of flour were used, one in 150 cc. of the acid solution and the other in 75 cc. Viscosity measurements were made immediately after mixing the flour with the solution. All three dispersion media showed their optimum peptizing power at about 0.02 mol. For all concentrations below 0.05 mol the viscosities were approximately the same for all the flours. As viscosity increases in the more concentrated dispersions, the differences for different flours become relatively much larger. The swelling behavior was essentially the same in the 75 cc. tests as in those using 150 cc. of the dilute acid. Of the three acids, flour swells most in lactic, less in acetic and only very slightly in oxalic acid solutions. The results indicate the characteristics in which flours differ in swelling behavior, and those in which they are similar, but they do not in themselves provide a basis for testing or evaluation.

Digest from "Studies on the Swelling of Flour," by Th. Ruemele, *Zeitschrift für Untersuchung der Lebensmittel* 73, 142, 1937.

BEVERAGES

Why Some Wines Resist Souring

WINES NATURALLY CONTAIN some boric acid, sometimes in such quantity that adulteration is suspected. Comparison of the boric acid content with the origin of the wine shows, as might be expected, that soils with high boron content make wines richer in boric acid. It has been noted that immunity to the acetification disease is greater in wines naturally rich in boric acid, and so a number of tests have been made with pure cultures of acetifying organisms (*Mycoderma vini* and others) to confirm the logical inference that boric acid is responsible for such immunity.

Very small doses (from about 0.01 per cent to about 0.025 per cent) are actually favorable to acetification but, as the boric acid content increases, it begins to inhibit the growth of the organisms and finally reaches a degree of toxicity which stops growth altogether. Thus it may be said that about 0.037 per cent begins to have an inhibiting action and about 0.10 per cent of boric acid in a wine is definitely toxic to the acetifying organisms.

In the interpretation of these figures it must be borne in mind, however, that wines naturally contain certain substances which can combine chemically with boric acid and thus destroy its antiseptic potency. Sugars, tartaric acid, glycerol and tannins may have this effect. It is not the quantity of boric acid added to a wine which determines the antiseptic effect, but the quantity which remains uncombined in the wine, i.e. as free boric acid.

Digest from "Resistance of Borated Wines to Acetification Disease," by Matei Niculescu, *Chimie et Industrie* 37, 646. 1937. (Published in France.)

CANNING

Whole Meal in a Can

COMPARTMENT CANS for the packaging of different foods which may be heated and served as a hot meal are provided for in U.S. Patent No. 2,073,636 granted March 16, 1937.

These cans are partitioned in a cross-sectional manner to form compartments that are tightly sealed in relation to each other. A section of the lengthwise side of the cans is flattened and weakened at its parallel edges so that the cans may be opened by a key to provide a means of emptying the several compartments of the cans. These compartments are assembled to permit separation and opening as separate units if desired.

Compartmented containers for different foods may have the form of rectangular trays as described in U.S. Patent No. 2,073,635 also granted on March 16. Each tray is composed of a group of smaller rectangular trays in which each of the various foods are contained and kept separate from the contents of the other small trays. Each small tray is opened by keys similar to those commonly used on fish or vacuum-packed coffee cans.

Both patents were granted to Edward Holoubek, Roy, Mont.

Canned Cereal Porridge

CANNING OF NON-LUMPING CEREALS such as hominy is not new. Cooking of wheat, oatmeal and similar glutenous cereals in the sealed can is quite something else. Not only do they lump during cooking unless well agitated. They are likely to give off an unpleasant and sales-killing odor when the cans are opened and to have an undesirable appearance.

Claims covering method and means of overcoming these objectionable features of canned oatmeal, rolled and steel cut, are made in U.S. Patent No. 2,068,910. A two-stage cooking process is set forth.

The first stage is carried out in an open kettle or in a steam cooker under pressure. Cooking is done at active boiling temperatures and with constant stirring, either manual or mechanical. Regardless of temperature and pressure this preliminary cooking continues until the cereal swells and the starch is soft.

Second stage begins after the hot precooked mass is run into cans and sealed. Cooking pressures range from 2 to 10 lb. per sq.in. and varying time depending upon type of cereal. At 7 lb. pressure rolled oats are processed 60 minutes, steel cut oats require 80 minutes. No objectionable odor develops. If the processing pressure is above 10 lb. per sq.in. the unpleasant and sales-destroying odor results.

At end of processing period the cans and contents are cooled slowly in a water-filled vat to room temperatures (60-70 deg. F.) to avoid sticking of contents to sides and ends of cans with subsequent deterioration in color. Preferred time of cooling from 230 deg. F. to room temperature is approximately 30 minutes.

Patent was granted Jan. 26 to Elizabeth C. Forbes, Fallston, Md.

DAIRY PRODUCTS

To Incorporate Vitamins in Sweetened Condensed Milk

ACCORDING TO BRITISH PATENT 458,-399 (granted March 11, 1937 to Societe d'Etudes et Applications Industrielles, Lausanne, Switzerland), sweetened condensed milk can be most effectively enriched in vitamins by incorporating the fat-soluble and the water-soluble vitamins in the product separately and at different stages of the preparation and condensation. Each is emulsified in sweetened condensed milk to facilitate intimate admixture when it is then added to the milk to be fortified with vitamins. For example, a vitamin D concentrate in codliver oil or halibut liver oil is emulsified in sweetened condensed milk and added to the fresh milk (raw or pasteurized) before it enters the evaporators. Vitamin B is introduced in similar fashion but, at any later stage, after vitamin D. More care is needed with vitamin C because of the acidity of its concentrates. It may be in the form of ascorbic acid, or lemon juice, or any suitable extract, but it must be added slowly and in small portions to avoid coagulating the milk. Milk powder, or preparations such as pastes or blocks, can be made up from the vitamin-enriched condensed milk.

A Possible Cause of Oxidized Flavor in Milk

"OXIDIZED" OR "CARDBOARDY" flavor is one of the most harassing problems which confront the milk industry today. Up to now no practical solution of the problem has been presented which will always prevent the development of oxidized flavor. The authors have tested fifteen different practices in an ineffectual effort to avoid the trouble.

All of the following efforts failed: eliminating rusty pails and cans; replacement of exposed copper by stainless steel; tinning all valves, pumps and pipe lines; discarding the first milk through the system; eliminating all dairy detergents; sterilizing all equipment with hot water (180 deg. F.) instead of with chlorine; varying the speed of cooling freshly drawn milk; aerating it; prompt pasteurization; varying speed of heating during pasteurization, and cooling afterward; aerating pasteurized milk; increasing the number of lactic acid bacteria before and after pasteurizing; eliminating milk from certain cows; retinning all equipment not made of stainless steel.

Comparing the behavior of milk in two separate dairies led to the discovery that the one significant difference was the acidity of the milk. This led to tests in which the natural acidity was controlled by the addition of pure calcium carbonate.

When the acidity was kept below 0.145 per cent there occurred no development of oxidized flavor. Neutralization to 0.15 per cent, however, did not prevent oxidized flavor in all cases. High acid milk invariably developed it upon pasteurization.

The addition of calcium carbonate to milk is not recommended. Rather the authors propose to study the mineral nutrition of cows, with the idea of avoiding the problem by different feeding methods.

Digest from "Relation of Acidity of Milk to Oxidized Flavor," by Anderson, Dowd and Stuewer. *Food Research*, 2, 143, 1937.

CHOCOLATE

Data on Cocoa Shell

COCOA SHELL is the only important by-product of the cocoa and chocolate industry. From 100 lb. of cocoa beans the yield is about 10.5 lb. of practically pure shell, containing 2 to 3 per cent of unseparated cocoa nib. Because of its vitamin D potency (at least $\frac{1}{4}$ of that of cod liver oil—International Units given by various investigators are: 28 by Knapp and Coward; 36 by Kon and Henry; from 31 to 125 by Alcenich) and its theobromine content which acts as a valuable stimulant, cocoa shell (2 lb. per animal per day), has been accepted as a useful ingredient in cattle cake and other fodders for milch cows. Below is given a complete analysis of a sample of commercial roasted large shell (variety not stated):

	Per Cent
Moisture	3.8
Fat	3.4
Ash:	
Total	8.1
Water soluble	3.5
Water insoluble	4.6
Silica (acid insoluble)	1.1
Alkalinity (as K_2O)	2.6
Chlorides (as salts)	0.07
Iron (Fe_2O_3)	0.03
Phos. acid (P_2O_5)	0.8
Copper	0.004
Nitrogen:	
Total N	2.8
Protein N	2.1
Ammonia N	0.04
Amide N	0.1
Theobromine	1.3
Caffeine	0.1
Carbohydrates:	
Sucrose	0.0
Glucose	0.1
Starch (takadiastase)	2.8*
Pectins	8.0
Fiber	18.6
Cellulose	13.7
Pentosans	7.1
Mucilage	9.0
Tannins:	
Acetone soluble	1.8
Tannic acid (Lowenthal)	1.3
Cocoa Red	2.0
Acids:	
Acetic (free)	0.1
Citric	0.7
Oxalic	0.32
Extracts:	
Cold water	20.0
Alcohol	10.0

*Other tests indicate that there is no true starch in cocoa shell.

Digest from "Cocoa Shell and Its Use as an Accessory Fodder," by A. W. Knapp and A. Churchman. *Chemistry and Industry*, 56, 29. Jan. 9, 1937. (Published in England.)

FROZEN FOODS

Vitamin C in Lima Beans For Freezing

ABOUT A THIRD OF THE ASCORBIC ACID of lima beans is lost during blanching according to the usual process (150 seconds) followed in preparing the beans for freezing. The loss can be materially reduced by cutting the blanching time in half. This shorter time is found to be adequate for the inactivation of the enzymes which cause development of off-flavors and loss of color in the beans during storage.

Large-seed pole varieties are higher in vitamin C than large-seed bush limas; however, small beans in a single variety contain more of it on a percentage basis than the larger beans.

Digest from "Vitamin C in Vegetables, VII. Lima Beans," by Tressler, Mack and Jenkins. *Food Research*, 2, 175, 1937.

Frozen Pack Spinach and Kale

SPINACH AND KALE were blanched (scalded) for periods of one, three, five, seven, minutes in steam at 212 deg. F. Three and five-minute blanch seemed to be best. Then three- and five-minute blanched leaves were packed into tin cans and paper cups; whole leaves and chopped leaves; with 2 per cent salt brine; 0.24 per cent calcium chloride; and without added liquid. The purpose of the calcium chloride was to precipitate some of the natural oxalic acid to see if it would prevent "furring" of the teeth as noted by many consumers. (It did.)

Packs in tin cans were frozen at —100 deg. F. by dry ice. Paper cup packs were held at 40 deg. F. for four hours. Then all packs were put into a temperature of 15 deg. F.

The three-minute blanch was best for frozen pack spinach and five-minute blanch was best for frozen pack kale. While in this investigation storage was at 15 deg. F., storage at 0 deg. F. is to be recommended to hold the flavor over long periods of time. Blanching, freezing and storage at 15 deg. F. reduced the microbial content of spinach and kale by more than 99 per cent. No conclusions were drawn from the use of calcium chloride in the brine but it worked out satisfactorily. The 2 per cent salt brine was not satisfactory.

Digest from "Spinach and Kale in Frozen Pack," I. Scalding Tests, II, Microbiological Studies," by H. F. Smart and B. C. Brunstetter. *Food Research*, 2, 151, 1937.

(*Turn to page* 475)

Food Equipment News

REVIEW OF FOOD PROCESSING EQUIPMENT, ACCESSORIES, AND SUPPLIES

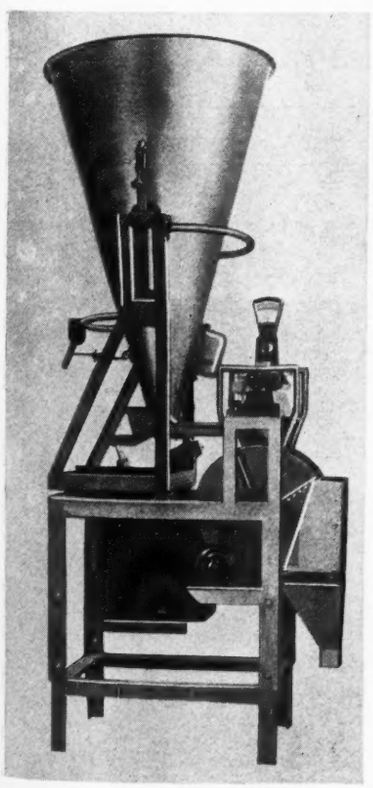
Batch Weigher

FOR WEIGHING OUT NET BATCHES of solid materials, in rapid succession and with precision, Syntron Co., Homer City, Pa., is making a new model in its line of net batch weighing machines, built around the weight control of its "Vibra-Flow" feeder conveyors.

This weigher consists of a vibrating feeder trough supplied with material by a vibrating supply hopper, and discharging into a circular hopper divided into four compartments. This hopper is suspended from a check weighing scale that is fitted with electrical controls which first cut down the high speed feed to a dribble feed when 80 per cent of the batch has been fed, and then cut off this dribble feed when the exact weight is reached in the weigh hopper.

Next the hopper is automatically turned one quarter of a turn, so as to discharge the filled compartment and bring an empty compartment into position for a new batch.

Weigher shown in the photograph weighs net batches of macaroni and noodles from ¼ oz. to 5 lb.



Automatic net batch weighing machine.

Gasoline Factory Trucks

A COMPLETE LINE of gasoline engine powered elevating platform trucks is now manufactured by Baker-Raulang Co., 2180 West 25th Street, Cleveland, Ohio. They are available in capacities of 3, 4 and 5 tons. Maximum speed is 10 miles per hour. The 3-ton model, with a standard 55 in. platform has an overall length of 115½ in. an outside turning radius of 99 in., and is able to make a right angle turn in 106 in. intersecting aisles while carrying a loaded skid 36 in. wide and 60 in. long. The 4- and 5-ton trucks have an overall length of 117⅜ in., outside turning radius of 107½ in. and will turn in 111 in. intersecting aisles with a 36x60 in. skid.

Motor Speed Controls

HYDRAULIC and mechanical remote speed controls have been developed by U.S. Electrical Motors, Inc., Los Angeles, Calif., for use with the "U.S. Varidrive" motor.

The hydraulic control is effected by means of turning a hand wheel at a remote control station. This forces the liquid at the remote control station through tubing, thus moving the cylinder on the variable speed unit at the motor and changing the speed.

The mechanical remote control operates by means of a chain and sprockets, the chain being moved by a hand wheel at the remote control station.

Ice Cream Vender

THE "FROST-O-MATIC" is a vending machine designed to make possible the distribution of ice cream to the consuming public at points where other means of distribution cannot be economically carried out. It is made by Ice Cream Venders, Inc., 9 Rockefeller Plaza, New York, N. Y.

Of the two photographs shown, one pictures the machine as installed for test purposes in the New York subway. The other shows the vendor with doors opened.

Exterior of ice cream vending machine.

Referring to the latter photograph, in the upper right is an insulated compartment for the storage of a three day's supply of solid carbon dioxide, which is used to refrigerate the ice cream storage compartment. This latter compartment, also insulated, appears at the left. It has space to accommodate 150 5-cent packages of ice cream.

At the lower right hand side is the mechanical unit which actuates the delivery mechanism upon the insertion of a nickel. The coin selecting device is an integral part of this mechanism. The manufacturers state that this coin selector, on a test of 15,000 sales, accepted only two slugs.

Immediately below the ice cream storage compartment is the delivery chute and mechanism which delivers one brick at a time to the outlet trap upon insertion of a coin and operation of the delivery lever.

Ice cream vending machine with the doors open.

Because of the wide range of temperature between indoors and outdoors, winter and summer, the machine is provided with a means of controlling the temperature.

Laboratory Light Source

AMERICAN INSTRUMENT CO., INC., Silver Spring, Md., is marketing the "Lablamp," a mono-chromatic light source for spectrophotometric, refractometric, microscopic and polarimetric measurements. It has an output of 3,500 lumens of visible light, and its efficiency is said to be twice that of an ordinary 500 watt incandescent lamp.

In this lamp, the effective light source is concentrated in a 1/10 in. by ½ in. space. A small quartz tube surrounded by a hard glass envelope absorbs most of the light below 0.32 microns in wave length (that is, the ultra-violet light). Of the total radiation, 25 per cent occurs in the visible spectrum, compared to 5 per cent in the incandescent lamp.

The lamp housing is adjustable to any angular position in a horizontal plane, and at any height from 5¾ in. to 20 in. from the bottom of the base. Doors on three sides of the housing can be removed and replaced by light filters.

Air Circulator

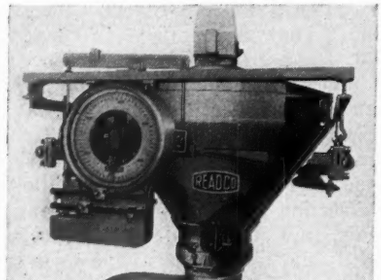
AN AIR CIRCULATOR that is said to project five helical air streams at high velocity, called the "Roto-Beam," is manufactured by Motor Service & Mfg. Co., 3,300 Indiana Ave., Chicago, Ill. It is available in a.c. and d.c. models, three speeds, in 18, 20 and 24 in. sizes, and in the "Roto-Beam" Junior, a.c. and d.c., 8, 10 and 12 in., models, with three speeds; in single speed a.c. models, and in a 12 in. deluxe model.

The design of fan is claimed to be able to replace several ordinary electric fans, while consuming less electricity. The propeller of this air circulator may be adjusted to any position within two complete circles, both horizontally and vertically, directing the air streams in any desired direction. The design of the propeller is said to eliminate all inactive air pockets.

Flour Weighing Hopper

READ MACHINERY CO., INC., York, Pa., has been assigned the exclusive rights for manufacturing a new patented automatic dustless weighing hopper, particularly suited to handling flour in bakeries. The device consists of a set of butterfly discharge gates which operate coincidentally with a sliding sleeve. This sleeve is raised and lowered by means of toggle connections to the shaft controlling the butterfly discharge gates.

The sleeve consists of two annular rings, through the inside one of which the contents of the hopper is discharged.



Dustless flour weighing hopper.

The space between these two annular rings permits the displaced air, in the mixing bowl which is being filled, to be returned with the dust directly into two flues on the interior of the hopper. The pressure exerted by reason of the displaced air in the filled vessel, plus a partial vacuum created in the hopper by the discharge of its contents, automatically returns all dust to the interior of the hopper.

This weighing hopper can be installed in stationary position or mounted on a roller bearing trolley for discharging into a number of mixers. It can also be used with an extended discharge spout and cover for cake batch mixing bowls.

Low-Pressure Refrigeration

SELF-CONTAINED LOW-PRESSURE REFRIGERATION units are being made by Carbondale Division of Worthington Pump & Machinery Corp., Harrison, N. J. These units employ either Freon or methyl chloride as a refrigerant and are recommended by the maker for either air conditioning or general refrigeration purposes.

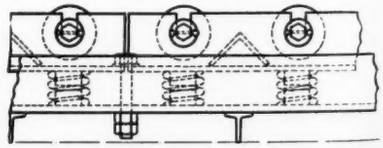
Industrial Truck Controller

AUTOMATIC TRANSPORTATION CO., 101 West 87th St., Chicago, Ill., has developed a new type of controller for electric storage battery trucks. In this device the important innovation consists in the use of a motor type brush mounting that is rotary in action, not stationary as in former controller designs. Other changes include stator segments of commutator type, unit molded into a permanent insulated base with no loose segments and no separate parts. This base is a stationary mounting and does not rotate as in other designs. Another feature is that the brushes are provided with a constant spring tension that is self compensating and requires no manual adjustment. Brushes also have large contact areas to insure low voltage loss.

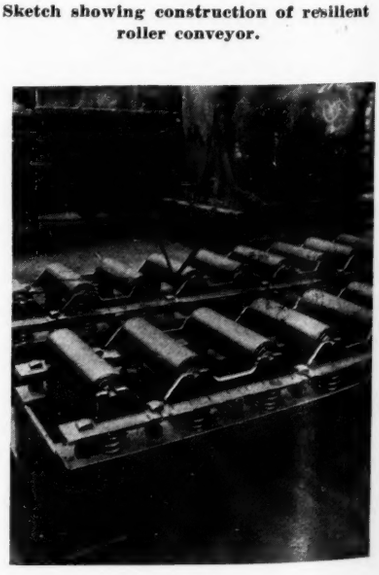
The makers claim that this controller gives reliable voltage control, smooth performance, and long electro-mechanical life.

Resilient Roller Conveyor

MATHEWS CONVEYOR CO., Ellwood City, Pa., is manufacturing a resilient type of roller conveyor. In this equipment, shown in the accompanying drawing and photograph, coil springs are mounted under each end of each roller, between the conveyor side frames and a heavy metal carrying structure. These springs absorb shocks when the conveyor is subject to heavy duty, protecting the rollers, bearings and shafts from injury.



Sketch showing construction of resilient roller conveyor.



Section of resilient roller conveyor.

Bacteria Control

OAKITE PRODUCTS, INC., 22 Thames St., New York, N. Y., has developed a material for controlling the bacteria and other microorganisms present in air-conditioning systems. It is called "Oakite Airefiner." When added to the recirculating water used to wash or scrub the air, it is said to keep the water sterile and to prevent the growth of slime and algae deposits in the system. According to the manufacturer, this new material is completely soluble, transmits no odor to water or air, and provides a stable, colorless solution that is safe and non-toxic. It is non-corrosive to metal surfaces and helps to prevent scale formation. Economy is also claimed, as but small amounts are required to keep the water sterile.

Electric Flow Meter

BAILEY METER CO., 1050 Ivanhoe Road, Cleveland, Ohio, is making an electrically operated flow meter called the "Synchro-Meter." This meter consists of two parts, a transmitting unit operated by a Ledoux bell flow measuring mechanism, and a receiver consisting of indicating, recording and integrating instruments. The transmitter is located at the point of measurement and the receiver at any convenient point or points for observation.

In operation, changes in flow at the transmitter, operating through an electrical circuit, change the position of the meters at the receiver.

Paper Shredder

THE "ELTEKON" paper shredder is a device for turning waste paper into shredded paper for packing purposes. It is made by Manufacturing Distributors Co., 45 North 20th St., East Orange, N. J. The machine is driven by electric motor through a worm gear reduction. Capacity is 1,000 lb. per hour.

Pipe Expansion Joint

FOR TAKING CARE OF AXIAL MOVEMENT, and expansion and contraction in pipes and for absorbing vibration in pipe lines, Foster Wheeler Corporation, 165 Broadway, New York, N. Y., is making the "Type S" stainless steel expansion joint. It is of the bellows type, and is made for various pressures up to 300 lb. and temperatures up to 750 deg. F.

Extinguisher for Trucks

HEAVY VEHICLE TYPE "PYRENE" fire extinguishers of "shock absorber" construction to withstand truck vibration are now being made by Pyrene Mfg. Co., 560 Belmont Ave., Newark, N. J. These come with two styles of bracket: one for mounting on the steering post; and the other for any position on the dash or inside the cab. In addition to the conventional retaining cup at bottom and spring clips at top, these brackets hold the extinguisher securely by a metal strap with quick-opening spring buckle.

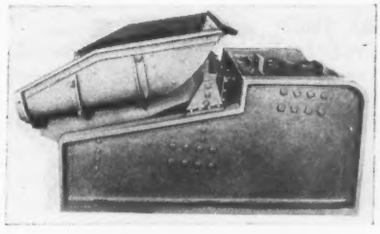
Small Air Compressors

INGERSOLL-RAND CO., 11 Broadway, New York, N. Y., is now making a line of small air compressors in $\frac{1}{4}$ and $\frac{1}{2}$ hp. sizes. These units are driven by a brushless, capacitor type motor when furnished for single phase current. Both motor and compressor are mounted on the receiver tank, with a built-in automatic protection switch giving underload and over-voltage protection. They are rated for 150 lb. maximum pressure. Height of unit and tank is less than 35 in.

Feeding Device

ALLIS-CHALMERS MFG. CO., Milwaukee, Wis., has brought out a new feeder for use where material must be fed at a highly uniform rate. Called the "Utah," this feeder operates on an electro-magnetic principle, having no sliding or rotating parts, no bearings, and requiring no lubrication.

The power unit of the feeder receives its power through a small rectifier mounted on the wall, together with a small auto transformer and an amplitude speed adjusting switch. It consists of a straight line reciprocating armature mounted between two pole pieces. The rectifier splits the alternating current cycle, one half of the sine wave going to one pole piece, the other half ot the other pole piece. The armature does not touch the magnets or pole pieces, proper air gaps being provided. There being no contact and no sparking, the unit is well adapted for use in explosive atmosheres.

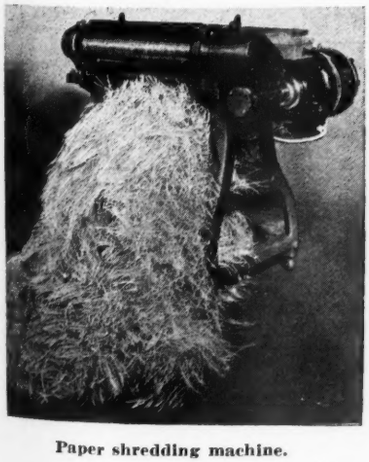


Electro-magnetic feeder.

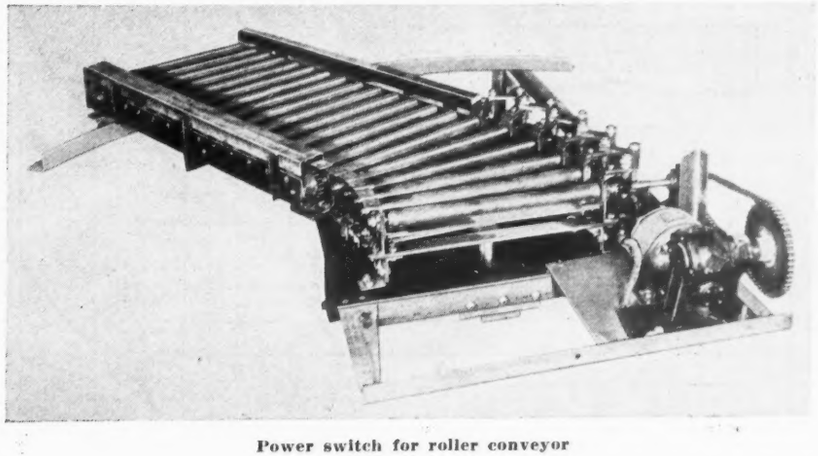
The "Utah" feeder comes in two types, one suspended and the other rubber mounted on the foundation. It can be built in any size or form of deck to suit the application. It can be had enclosed for dusty materials, and can be synchronized with crushers, screens, conveyors or other equipment.

Roller Conveyor Switch

A FULL POWERED RADIAL SWITCH for use with roller conveyors has been developed by Standard Conveyor Co., North St. Paul, Minn. This switch permits intermediate discharge at one or more points by push button control. The rollers in the switch section are power driven, and the drive is effective whether the switch is in position for travel straight ahead or for discharge on a lateral line. Switch position changes are also effected by motor power.



Paper shredding machine.



Power switch for roller conveyor

BUSINESS TRENDS

Commodity Markets Firm

THE LEVELING OFF IN COMMODITY PRICES noted through June has continued during July. As was to be expected, the reaction from inflated markets, which occurred in the early spring, went too far in some cases. Since then, these out-of-line prices have come back toward the general level. Mid-July saw a slight increase, the general price level rising about 2.2 per cent from the mid-June figure. Food prices, however, having been more out of line, increased in the same period about 8.7 per cent. Prof. Irving Fisher's index number of average commodity prices was reported on July 7 at 92.9 (1926-100), compared with a figure of 92 one month before.

What happens in the commodity markets from now on is likely to depend mostly upon general business activity. If the present seasonal drop in business is followed by renewed business advance, it is possible that commodity prices will also continue upward. How this will affect raw material prices for the food manufacturer will depend upon the size and quality of the crops that are now being harvested.

Wheat Surplus Certain

ANY UNCERTAINTY that existed last month, as to the possibility of an export surplus of wheat this crop year, has been dispelled. The only question now is how much, as the average of most present estimates is around 170,000,000 bu.

Normally, U.S. wheat demand does not exceed 650,000,000 bu., which would leave a total surplus of from 220,000,000 to 230,000,000 bu. There are late reports of considerable rust damage in the Dakotas, and as some of the wheat will undoubtedly be used for livestock feed, pending the later harvest of feed grains, and some will be retained in storage as carryover, the estimate of 170,000,000 bu. export surplus seems to be a reasonable guess.

A factor to be considered in the world wheat situation is the supply prospects in other countries. Drought and heat are expected to reduce the Canadian crop by some 60 per cent. Exports from Russia are not expected to be large. Also, the winter weather in the Argentine is dry, indicating that the next crop from that region may be short.

On the whole, the prospects are for considerable export demand at good prices for United States wheat. This should go far to hold up the domestic price, in spite of the large wheat harvest.

Construction News

	Pending (thousands)	Awarded July (thousands)	Total Awarded 1937 (thousands)
Bakery	$485	$80	$774
Beverages	600	380	5,361
Canning and Preserving	40	55	1,040
Confectionery	40	.....	.....
Grain Mill Products	2,835	.....	2,006
Ice Manufactured	....	35	720
Meats and Meat Products	30	155	1,208
Milk Products	160	75	4,618
Miscellaneous	1,070	588	6,307
	$5,260	$1,368	$22,034

Favorable Crop Weather

MOST SECTIONS of the United States had favorable crop growing weather in June and the first half of July. Prospects for wheat have already been detailed. Corn has had nearly ideal growing conditions and growth has been unusually rapid. The July estimate (U.S.D.A.) for the corn crop is 2,571,851,000 bu., which is about 16,000,000 bu. more than the average of the 1932–1936 crops. Oats, barley and rye are all forecast to yield much better crops than last year and to be equal to or better than the five year average.

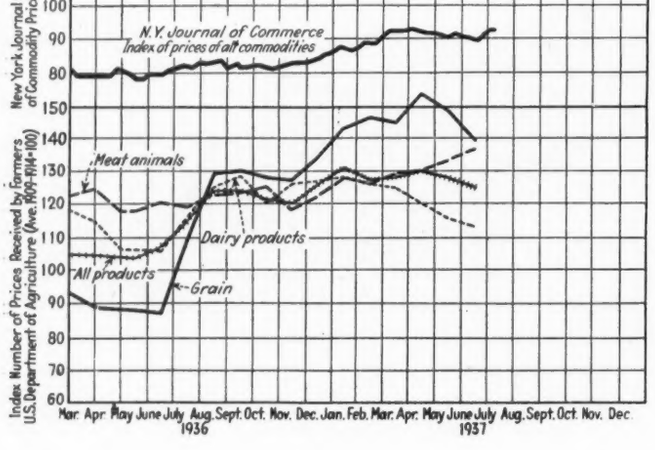
Other crop forecasts show expected yields mostly around normal or better. Apples are a high spot, with the forecast of 194,328,000 bu. exceeding the best crop of recent years. Last year only 117,506,000 bu. of apples were produced and the average annual production has been 164,355,000 bu. in recent years.

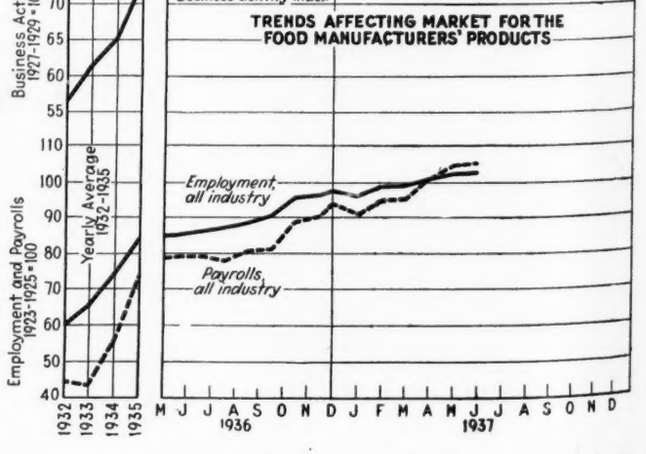
Other prospective fruit yields are excellent. Prunes for drying are expected to total about 223,000 tons, as compared to about 175,000 tons in 1936. Pacific Coast pear crop prospects are slightly better than in 1936. The peach crop is expected to be 2 or 3 per cent greater than last year. And the raisin harvest now appears likely to better that of any year since 1928.

Domestic Fats and Oils

IN SPITE OF the lowered lard output next year, as indicated by the spring pig report issued last month by the Bureau of Agricultural Economics, there should be ample supplies of domestic fats and oils. The government report indicated a decline of 6 per cent in the total spring and fall pig crop for this year. This, in turn, would seem to forecast a somewhat lowered lard output.

In contrast, the cotton crop indicated in the July report of the United States


TRENDS OF PRICES PAID BY FOOD PROCESSORS FOR RAW MATERIALS
New York Journal of Commerce Index of Commodity Prices (Av. 1921-1929=100)
N.Y. Journal of Commerce Index of prices of all commodities
Index Number of Prices Received by Farmers U.S. Department of Agriculture (Ave. 1909-1914=100)
Meat animals
Dairy products
All products
Grain
Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1936
1937



Business Rebounds

QUICKLY SNAPPING BACK from the mid-June slump induced by labor paralysis and gold jitters, business resumed its upward climb in the four weeks between June 19 and July 17. In that period the *Business Week* index of business activity recorded a 3.40 per cent advance, soaring from 76.5 of normal to 79.1.

Labor troubles are at least temporarily ebbing with the back-to-work movement in the steel industry causing steel output to rise again toward 1929 levels. Construction continues at a relatively high level, particularly in the private and residential categories. Electric power consumption is running at levels consistently around 10 per cent above 1936. What promise to be bumper crops are approaching the harvest season. For the third year in succession, the one-time normal summer slump seems to be largely confined to financial markets.

Wholesale prices of all commodities, as reported by the United States Department of Agriculture, have increased 1.27 per cent in the five weeks from June 12 to July 17. For farm products this index shows an increase of 3.52 per cent during the same period, while the index of wholesale food prices has risen 1.89 per cent. In the five weeks from June 19 to July 24, the New York *Journal of Commerce* weighted price indexes have also risen, the general index going up 1.00 per cent, the index for foods increasing 1.89 per cent, while the index for grain prices declined 0.66 per cent.

Department of Agriculture, should give a cotton seed oil production of about 3,200,000 bbl., with average yield. In addition, domestic output of both soy bean oil and peanut oil can be expected to increase.

The situation in the peanut oil industry is particularly worthy of notice. Average factory production of crude peanut oil in the years immediately preceding the 1934–35 crushing season was around 13,000,000 lb. In 1934–35 the output was 56,000,000 lb. In 1935-36, production increased to 64,000,00 lb. In the first six months of the 1936-37 crushing season, output was 67,000,000 lb. Should peanut oil continue to increase at anywhere near the present rate, it seems bound to rise from its present position, in which it accounts for only about 3 per cent of United States vegetable oil consumption.

Soy bean acreage this year shows a 7 per cent increase over 1936 plantings, indicating that more oil from this source is likely to be available. As corn oil is purely a byproduct, its production depends upon the output of starch and dextrose. At present, no increase in corn oil production is in prospect.

Also noteworthy, as affecting the fats and oil markets, is the fact that oleomargarine consumption is reported by the National Association of Margarine Manufacturers as running 2 to 3 per cent above last year in recent months.

More Light on Olive Oil

IT HAS BEEN ASSUMED that Spanish civil war and lowered output in other countries would severely curtail the supply of olive oil. Recent figures reported by Agricultural Attaché N. I. Nielson from Paris confirm this. According to his report, the total 1936-1937 output of the Mediterranean basin will be about 737,400 short tons, including an estimated Spanish production of 385,000 tons.

This output compares to an olive oil output in the same countries in 1935-1936 of 1,013,100 short tons, and a five-year average of 929,000 short tons. And, as the availability of the Spanish production is problematical, to say the least, it is evident that the shortage may become really acute.

INDICATORS

STRAWBERRY CROP for 1937 is forecast by the U.S. Department of Agriculture as 11,705,000 crates, compared to 10,010,000 crates in 1936.

CHERRY YIELD, sweet and sour, is forecast at 159,560 tons for 1937, which compares to last year's crop of 115,160 tons, and a five-year average crop of 116,704 tons.

GREEN LIMA BEANS for manufacture should be more plentiful this year than last, as the reported planted acreage of 46,380 acres shows a 35 per cent increase.

PEA ACREAGE, for canning, according to a recent private estimator, totals 355,300 acres this year. The same estimator reported 338,200 acres planted to peas for canning in 1936, with a yield of 16,241,000 cases.

PEA PRODUCTION for canning in 1937 is estimated at 256,280 tons by the Bureau of Agricultural Economics, which compares with an estimated production of 187,420 tons last year.

BUTTER, CREAMERY, in storage July 1, 1937 totaled 83,151,000 lb., compared to 73,816,000 lb. on July 1, 1936.

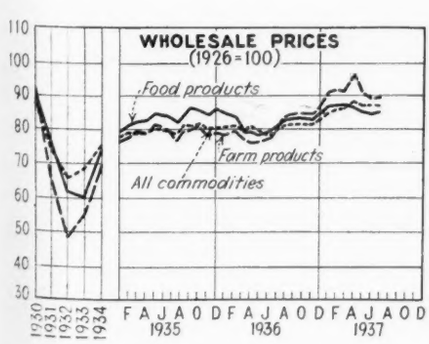
CHEESE, ALL VARIETIES, in storage on July 1, 1937, equaled 105,335,000 lb., considerably more than the 85,798,000 lb. in storage on the same date of 1936, and 1932-36 average of 80,659,000 lb.

EGGS IN STORAGE, July 1, 1937, totaled 13,236,000 cases, compared to 10,250,000 cases on the same date in 1936, and a 1932-1936 average for the date of 10,945,000 cases.

POULTRY IN COLD STORAGE, July 1, 1937, was 77,205,000 lb. On July 1, 1936, the figure was 43,050,000 lb. and for the 1932-36 average it was 43,277,000 lb.

MEAT IN STORAGE, all kinds, July 1, 1937, totaled 716,873,000 lb., compared to 534,407,000 lb. a year previous and a five year average (1932-1936) of 699,892,000 lb.

FOOD INDEX OF DUN & BRADSTREET, on July 13, was reported at $2.90, 5.8 per cent above the 1936 level on the same day, and comparing to $2.82 on June 15, 1937.



Prices received by farmers are from the U. S. Department of Agriculture. Employment, payrolls, wholesale prices and retail prices from the U. S. Department of Labor. The business activity index is that of *The Business Week*. The cost of living index is from the National Industrial Conference Board.

Per Capita Fruit Consumption

According to R. M. Turner of Washington State College, the per capita consumption of certain fruits has shifted in the following manner:

	Average 1919-1923	Compared to period 1929-1935
Oranges	21 lb.	29 lb.
Grapefruit	5 lb.	9 lb.
Lemons	3 lb.	4 lb.
All citrus	29 lb.	42 lb.
Apples	72 lb.	60 lb.
Grapes	32 lb.	33 lb.
Peaches	21 lb.	20 lb.
Pears	7 lb.	9 lb.
Bananas	24 lb.	26 lb.
Total	185 lb.	190 lb.

Keeping Up WITH THE FIELD

Legislation Affecting Food Manufacturers—Government Regulations—Federal Trade Commission Rulings—Labor Problems—Technology

R-P Cases Settled

TWO CASES involving alleged violation of the Robinson-Patman Act in the food field were disposed of by the Federal Trade Commission on July 19. In one of the cases, an order to cease and desist was entered against the Biddle Purchasing Co., New York, and a group of sellers paying brokerage fees to that company and buyers receiving such fees from it. The FTC found that the Biddle Co. was the agent and representative of the buyers and acted for them in transactions with the sellers and that it was not the agent of the sellers. The Commission also found that brokerage fees always reached the buyers and in effect were actually paid by the seller to the buyer, which resulted in giving the buyer a discount in price.

The other case involved Kraft-Phenix Cheese Corp. In this instance, FTC dismissed its complaint, concluding that the price differentials shown by evidence collected in the case did not tend to create a monopoly nor lessen nor injure competition between the cheese company and its competitors. The Commission further ruled that these price differentials did not tend to injure competition among retailers selling cheese products.

Wages-Hours Bill Improved

INDUSTRY HEAVED a sigh of relief when the Senate Labor Committee reported out the pending wages-hours measure and the country learned that the bill had been drastically revised—and vastly improved from the point of view of American employers.

Most of the purely unnecessary features of the original measure were trimmed out by the Committee, which has provided a much more understandable measure, aimed at the elimination of starvation wages and inefficient, sweatshop hours. No one knows what the House committee will do with the measure, or what will happen to it on the floors of the two houses, but there is a distinct feeling that a swing away from unreasonable demands upon industry is to be seen in Congress, out of which may come a more coherent and satisfactory enactment.

The revised bill, as reported to the Senate would set up a 40-hour week, as a reasonable maximum, but it gives to the board power to make exceptions, though in no case can the maximum hours be put below 40. Forty cents an hour is set as the reasonable minimum wage, and the board may not require a wage in excess of that figure.

Chief difference between the revised and the original draft of the measure is that the latter is primarily concerned with ending evils, while the original bill was aimed at establishing a machine-made righteousness.

Gets Desist Order

A "CEASE AND DESIST" order was sent to California Packing Corp. and to its subsidiary, Alaska Packers Association, by the Federal Trade Commission on July 6.

The purpose of the order was to stop alleged practices having the effect of suppressing competition and tending to create a monopoly. Among the prohibited practices was the use of the magnitude of the respondents' freight shipments and buying power to induce industrial companies and steamship lines to ship commodities through Encinal Terminals, controlled by the respondents.

The companies admitted all the material allegations of the FTC complaint, and they waived the taking of further evidence and other intervening procedure, consenting to the issuance of findings of fact and the desist order.

Among the effects claimed by FTC to result from the outlawed practices were a reduction of distribution expenses and an increase in revenue to the respondents, to the unfair disadvantage of competitors. Competitors were said to be forced to pay more for raw materials and manufactured products than were the respondents.

Farm Bills Gain Support

WITH ANNOUNCEMENT of the President's views on farm legislation, and the importance he attaches to that phase of his program, pending measures dealing with agricultural problems take on a fresh and more vital aspect. Though these proposed bills have been thrust into the background by the Supreme Court debate, they have not been lost to sight. Their sponsors have been merely marking time, waiting for the opportune moment, which now appears to be close at hand.

The chief farm bill, containing the ever normal granary and crop control provisions so close to the heart of Secretary Wallace, although closely linked to other pending measures, is regarded as being politically and economically the most important. The crux of the measure lies in its provisions for loans on crop surpluses, to be stored in bumper years for use in periods when crops are short. The chief objection to this idea has been that such surpluses would be apt to grow to dimensions that would depress crop prices. To meet this objection the bill would provide authority for strict crop control. This major agricultural bill is expected to pass, unless by some unforeseen emergency the Congressional session is cut short—an unlikely event.

Two other farm measures have been receiving attention on Capitol Hill, and are nearing the end of the legislative routine. One is the modified farm tenancy bill, intended to facilitate the conversion of tenants into farm owner-operators. Differences between the two houses have been ironed out in committee.

The Senate has already approved the second of the two pending farm bills, which would put the Government in a group insurance program, beginning with wheat next year. A sub-committee of the House also has approved the proposed measure, which is considered to have a better than fifty-fifty chance.

Whither Sugar?

SUGAR LEGISLATION was still deadlocked when FOOD INDUSTRIES went to press. And some were predicting that there would be no legislation, the whole quota plan being allowed to collapse. Continental sugar interests, however, felt that the Administration would relent in time to have legislation at this session of Congress.

The House committee reported out a compromise measure which goes a long way toward satisfying the State Department and the Department of Agriculture. But as it does not provide for the extension of the refining privilege in Hawaii and Puerto Rico, the bill has the continued active opposition of the Department of the Interior. The committee added to the bill a ½-cent-a-pound tax on molasses to be used for the distillation of alcohol, this tax amounting to about 3 cents on a gallon.

If no further compromise can be worked out between the continental interests and the Administration, indications are that a resolution will be passed extending the present law. While Administration leaders say they will not agree to a continuing resolution, it is not thought likely that they would scrap the whole sugar plan, which stands out as the most successful feature in the agricultural program.

Food-Plant Accidents Up

FOOD COMPANIES failed in 1936 to reduce their injury rates, and now the industry is lagging behind others in the effectiveness of accident prevention work. Last year, the accident rate for the food field averaged 16.71 for frequency and 1.05 for severity, while for all industries, the frequency rate was 13.57 and the severity rate 1.64. This is revealed by National Safety Council in its annual report on accident rates.

Ranking 20th in frequency and 12th in severity in a list of 30 major industries, the food group experienced a 2 per cent increase in the frequency rate last year and a 4 per cent rise in severity. In comparison with this trend, there was a reduction of 1 per cent in frequency and an increase of 5 per cent in severity for all industries.

Of the various types of food companies, confectionery manufacturers had the lowest frequency rates, averaging 7.35, this industry having made a 30 per cent improvement in this respect since 1935. Cereal manufacturers effected the greatest reduction in severity, this amounting to 41 per cent.

"Hazardous arrangements" and "improper guarding" are the most important mechanical causes of permanent and partial disabilities and fatalities, it was shown by reports covering such cases during the last three years. Disregarding instructions, taking chances and other actions resulting from wrong attitudes on the part of employees were the principal personal causes of injuries. These factors contributed to almost one-half of all serious injuries.

Almost 29 per cent of the accidents were classified by type under "handling objects." The next most prevalent types were "machinery," amounting to 14.3 per cent, and "falls to the same level," amounting to 12.8 per cent.

Labor Loses Farmer Aid

STRIKING WORKERS went back on the job at Phillips Packing Co., Cambridge, Md., on July 9 at a 10 per cent increase in wages. Offhand this would seem another victory for organized labor, which has been more or less in the habit of getting its way these past many months. But there was a development during this strike which took from labor one of the weapons which has proven effective in its dealings with plants handling perishable raw materials, that weapon being pressure exerted by farmers on management for a settlement of the strike so that the produce would not spoil in the fields. In this case, the produce was stringless beans, of which 250 farmers had some 1,200 acres. Standing to lose $240,000, the farmers first pleaded for labor to accept the offer of an increase in wages. Failing in this, the growers found other outlets for their beans. Arrangements were made with Hillsboro-Queen Anne Cooperative Corp., which is connected with National Council of Cooperatives. In addition, other buyers appeared on the scene, there being trucks from points as far away as Georgia, Florida and Texas. Prices for beans mounted as high as $50 a ton in the field, most sales being made in the neighborhood of $40 to $40.50.

When the strike, which began on June 23, was finally terminated, the settlement was effected through the same wage increase offered by the company at the beginning of the trouble. This is said to make wages the same as under NRA.

During negotiations for settlement of the labor trouble, Phillips Packing Co. pointed out that it had operated for the past six months or more without profit to stockholders.

Acme

GOLDEN HARVEST ROLLS IN

No less than 3,366 carloads, or 5,385,000 bu. of wheat arrived at Turner, Kan., on one day, July 6. Coming from Oklahoma, Kansas and Texas, this flood set an all-time record at that receiving point. This situation is indicative of the size of the wheat crop this year. Government estimates place the total production at 882,000,000 bu. as compared with 626,000,000 bu. last year and the five-year average of 864,352,000 bu.

CONVENTIONS

AUGUST

18–21—National Food Distributors' Association, Sherman Hotel, Chicago.
22–28—Eleventh World's Dairy Congress, Berlin, Germany.
23–25—American Fisheries' Society, Mexico City, Mexico.

SEPTEMBER

6–10—American Chemical Society, semi-annual meeting, Rochester, N. Y.
14–17—Food Technology Conference, Massachusetts Institute of Technology, Cambridge, Mass.

Technology Conference

SOMETHING NEW in the way of instruction in the science of food technology is to be offered by Massachusetts Institute of Technology, Cambridge, Mass. M. I. T. will hold a conference, Sept. 14-17, to which food manufacturers, research workers, food officials and others interested in the scientific advancement of food engineering are invited.

At this conference there will be presented a number of papers dealing with general problems bearing on the food industries. And among the speakers who will talk on these subjects are Lewis W. Waters, vice-president, General Foods Corp.; Fred C. Blanck, division

of food research, Department of Agriculture; Gardiner Poole, director of research, Frosted Foods Corp.; and L. V. Burton, FOOD INDUSTRIES.

In addition to the general papers, there have been selected for special discussion topics relating to canning, to the application of low temperatures in food handling and treatment and to the advances in the field of dairy manufactures. The list of speakers who will cover these subjects includes some 35 men. Among them are E. J. Cameron, assistant director, National Canners' Laboratory; M. E. Parker, chief, research committee, Creamery Butter Manufacturers Association, Chicago; Dr. R. Plank, Technische Hochschule, Karlsruhe, Germany; Dr. F. Kidd, director, Low Temperature Research Station, Cambridge, England; Dr. S. C. Prescott, Massachusetts Institute of Technology; and Dr. Max Levine, Iowa State College.

Process Equipment Exhibit

THIS YEAR'S Chemical Exposition will be held in New York, Dec. 6-11. At this show of process-industries equipment will be exhibited many machines and products used in food processing plants. And aside from chemicals and processing machinery, there will be shown metals and alloys, brewing and bottling equipment, containers and packages and corrosion-resisting coatings.

Substandard Regulations

OFFICIAL REPUBLICATION of Department of Agriculture regulations regarding classification, testing and labeling of substandard canned goods occurred on July 12. The new regulations represent a few changes from those previously in force, but are essentially only a consolidation of the original rules and the numerous sheets of amendments and addenda which have been issued at intervals in the past.

CONCENTRATES

• Food and drug legislation late in July remained caught in the legislative jam caused by arguments over the Supreme Court bill . . . A vigorous campaign to purge the olive oil industry of fraud is being conducted by Olive Oil Association of America, and the Association is studying the feasibility of an attempt to obtain legislation requiring the denaturing of certain low-duty oils which can be used to adulterate olive oil.

• Good Humor Corp. has obtained an injunction in Superior Court at Bridgeport, Conn., against a competitor to prevent the selling of ice cream in trucks painted to resemble those of Good Humor . . . Mechanical separation of milk and recombination of the cream and skim milk produce a noticeable decrease in the sensitivity of the milk to copper-induced oxidized flavor, according to findings of Sealtest, Inc. . . . Weak solutions of acetic or lactic acids, which will kill the seed-carried germ of bacterial canker in tomatoes, will make possible the use of power machinery to extract tomato seeds, it has been revealed by research in the Bureau of Plant Industry.

• When sugar beets are grown in soil well supplied with phosphate fertilizer, they not only are larger but are more resistant to the decay that lowers their sugar content, it has been found by the Bureau of Plant Industry . . . An agricultural research laboratory will be built at Auburn, Ala., to study methods of controlling diseases and pests affecting livestock and poultry in the Southeast.

• J. Frank Grimes, president of Independent Grocers' Alliance, has been named chairman of the Food and Grocery Conference Committee to carry on the work done by Paul S. Willis in that capacity . . . *International Brewing Abstracts,* formerly published by Wahl Henius Institute, is now published by *Modern Brewer,* New York . . . The Seventh International Management Congress will be held in Washington, D. C., Sept. 19 to 23, 1938.

Mid-July

CAPITAL VIEWS

PARTY CONTROL is the major stake in the Democratic battle of Washington. The side which wins the Supreme Court packing case may also hold the purse strings of the party for 1938 and, more important, 1940.

Realignment of major parties is in the making. New dealers, laborites, old-school Democrats and the other shades and varieties of liberalism, are really contending for reelection by the present battle over machinery, patronage and federal spending power. Those who are Constitutionally minded, within and without the Democratic party, hope for a liberally led coalition to oppose third-termers and radical laborites; and, of course, they hope that the New Dealers and labor leaders will not back the same candidates.

SUGAR—Legislation for sugar control and taxation is all gummed up by Washington humidity. An entente of Wallace, Hull and Ickes is needed to put through a bill; but this is none too likely. Maximum present prospect is a ½-cent tax, perhaps none this year. But for next year, look out!

PROSPERITY—"Pessimistic prosperity" is the present Washington definition of business conditions. The prosperity relates to the volume of business being done and in prospect for the next year or two. The pessimism is based on the very real threat of continued labor trouble, higher raw-material costs, and vigorously administered merchandising restrictions. The food industries will not escape any of these troubles. Manufacturers who can retain a narrow margin of profit on increased quantities of business will be most fortunate.

FATS AND OILS—The old opposition of Washington spokesmen for the Dairy Union to imports of any fats or oils is now directed against Norwegian whale oil. The suggestion that a new trade agreement with Norway is to be proposed occasions the customary effort to ensure that "the American producer should dominate his own domestic market." Which, freely translated, means a higher income for butter fat, regardless what food and non-food fats and oils cost the consumer.

FOOD LAW—The pending food and drug legislation will get its first test in the House shortly, at a time when it is not even up for discussion. As the Lea bill, which gives general advertising control to the Federal Trade Commission, is considered, the prospects for food legislation will clarify. If the Lea bill loses (not likely), then the Food & Drug Administration can expect its new law with advertising control thrown in. In any event, FTC is going to have more authority next year, and plenty more money to prosecute its cases.

LEGISLATION—Forecasts on any legislative question are futile in the ultra-confused situation of Washington. Plenty of bills of importance to the food manufacturer are pending. Few will be seriously considered, and still fewer pass. But the fewest conceivable will still be plenty to add new management problems on labor relations, merchandising control and so forth. But it is anybody's guess what episode may pull the adjournment trigger. The most authoritative forecasters were merely guessing when they, during July, talked of adjournment about Sept. 1.

MEN, JOBS *and* COMPANIES

Industry

» AUSTIN PACKING Co. will spend $50,000 to erect an addition to its plant at Franklin, Pa.

» BURNS & Co. is constructing a new abattoir at Calgary, Alberta, at a cost of $150,000.

» CANADA PACKERS, LTD., Vancouver, B. C., has contracted for the construction of a new meat packing plant. The plant will have a system for deodorizing air before it is exhausted from the processing departments.

» COCA-COLA Co. will erect a $107,700 addition to its plant in Atlanta.

» GOLMAN BAKING Co., Dallas, will erect late this year a $200,000 plant to take care of increased business.

» GENERAL FOODS CORP. will construct at Kankakee, Ill., a plant for milling corn, and storage facilities for 1,500,000 bu. of corn. This will supplement the company's cereal activities at Battle Creek, Mich., where facilities have been enlarged. General Foods recently acquired Snow King Baking Powder Co., Cincinnati.

» H. J. HEINZ Co. is putting up a $40,000 warehouse in Seattle, and the company is expanding distribution activities in that territory.

» IBERIA SUGAR COOPERATIVE, INC., will erect a $1,000,000 refinery near New Iberia, La., to be in operation by Oct, 15.

» KRAFT-PHOENIX CHEESE CORP. will construct at Buffalo a two-story plant and office building to cost about $50,000.

» MAX AMS, INC., New York, has acquired Pittsburgh (Pa.) Importing & Mfg. Co., and plans to extend its territory to include Chicago, St. Louis and as far west as Los Angeles.

» MCCORMICK & Co., Baltimore, is giving a week's vacation to plant employees who entered the company before the first of the year.

» MCGOUGH BAKERIES is building a "sunlight" type of bakery, using glass brick, at Montgomery, Ala.

» MCDONALD BAKING Co. is spending $60,000 to establish a distributing plant at Linden, N. J.

BENJAMIN WOOD

He heads up the recently organized Tea Bureau of the United States, formed to handle and centralize the expanding activities of the tea industry in this country. Mr. Wood, a merchandising and advertising authority, resigned as an executive of Good Housekeeping to become managing director of the Tea Bureau.

» NESTLES MILK PRODUCTS, INC., has opened a new plant a Greenville, Ohio.

» NEW ENGLAND COLD STORAGE PLANT, Portland, Me., which is under the supervision of General Ice Cream Corp., has been modernized.

» QUAKER OATS Co. was awarded an injunction on July 3, in the Federal Court at Kansas City, against the use by a competitor of the word "puffed" as applied to cereal products.

» DR. PEPPER BOTTLING Co. has more than doubled the capacity of its plant at Corpus Christi since the first of the year. Installation of new machinery and remodeling of the bottling room have just been completed. The capacity is now 30,000 bottles daily.

» PETER PAN BAKERS, INC., has acquired the former R. D. Castle plant at Lansing, Mich., and will spend $70,000 for improvements.

» ROWLEY PACKING Co. has sold its plant at Racine, Wis., to Himan Nichol. However, Rowley's will continue operation of its seven retail stores.

» SANTA LUCIA WINERIES will construct a bottling plant at Montgomery, Ala. The plant will be equipped with a battery of sixteen tanks of 1,500 gal. capacity for storage. The wines will be shipped from Fresno, Calif. in tank cars.

» SHEFFIED FARMS Co. has under construction at New York a new milk plant which will cost $2,500,000. The plant is being built directly over the tracks of the New York Central Railroad, and raw milk will be brought to it in tank cars.

» SWIFT & Co. has constructed a $100,000 beef packing plant at Ocala, Fla., to be opened about Aug. 1. This is another step in the expansion of the meat industry in the South.

» TEXAS SEA FOODS Co., INC., has been conducting experimental work on freezing of fillets, shrimp, crab and oysters, and believes that this industry has a future on the Gulf Coast of Texas.

» TEXAS STAR FLOUR MILLS, Galveston, has installed new machinery to increase its capacity to 5,000 bbl. daily.

» WARNECKE BAKERY, Kansas City, is being consolidated with Smith Bakery of that city. Both plants are units of General Baking Co.

» WILLIAMS & Co., Portland, Ore., potato chip manufacturers, has moved into a modernistic plant with ten times the capacity of the factory vacated.

Personnel

» J. E. ALEXANDER has been named manager of the Orange (Texas) Rice Mill Co.

» A. J. AMOS, formerly of General Foods Co., is now with Chapman & Smith Co., Chicago, manufacturers of bakers' and confectioners' specialties.

» FRANK H. BLAKESLEE, Bradley-Smith Co., New Haven, Conn., has been appointed state chairman for Connecticut by National Confectioners' Association. He replaces J. T. Lehane, who resigned.

» R. M. BOHN is now in the research department of the Calumet Baking Powder division of General Foods Corp. He recently was with Read Machinery Co., York, Pa., and before that had been director of the Technical Institute of Independent Biscuit Manufacturers Co.

» FRANK H. CARPENTER has purchased the interest of his partner, Adolph Pfeffer, in the Adolph Pfeffer Rice Mill-

ing Co., Houston, for $175,000. Mr. Pfeffer will retire.

» ROBERT E. COON has been named assistant secretary of Quaker Oats Co., Chicago.

» DR. E. W. EICKELBERG has gone with Fairmont (Minn.) Canning Co. as chemist. He is in charge of raw products grading, quality control and experimental work. He formerly was in the chemistry department at Iowa State College.

» HENRY GERMAN has acquired sole ownership of German Bakeries, Inc., Forty Fort, Pa., and will spend $50,000 to expand the business. He is president of the company.

» DR. HARRY E. GORESLINE has been appointed senior bacteriologist of the food research division of the Bureau of Chemistry and Soils, and he heads up the work on microbiology. He was transferred to Washington from Geneva, N. Y., where he spent more than three years in charge of research on fruit utilization.

» OWEN B. HOLLOWAY, vice-president in charge of insurance with Quaker Oats Co., Chicago, retired on July 1 after more than 56 years of continuous association with the company and its predecessors. Alden K. Thomas retired as assistant secretary of the company after 51 years in its employ.

» DR. GEORGE J. HUCKER, chief of research on the staff of New York Agricultural Experiment Station, Geneva, N. Y., has accepted the invitation of the Ministry of Agriculture of New Zealand to spend a few weeks there advising them on problems of controlling an epidemic of food poisoning and septic sore throat. He will be gone about six months.

» JOHN W. KARN, for the last five years manager of the Green Bay, Wis., branch of National Biscuit Co., has been transferred to Salt Lake City. He was succeeded in Green Bay by John Rush.

» M. J. KENNEDY has been appointed manager of Borden's milk plant at Oklahoma City.

» H. W. KESSIG is now acting as production and field manager of the eight Mississippi plants of Kraft-Phenix Cheese Corp.

» J. K. MCLAUGHLIN, manager of the Peoria (Ill.) plant of Swift & Co., has been transferred to the Chicago office. He is succeeded at Peoria by J. F. Carney, Kansas City.

» FRED ROWE, former superintendent of Michigan Bakery, Kalamazoo, has been named manager of the firm.

» GEORGE RUCKDESCHEL is now president of Charles & Co., New York. He had been acting president since Victor H. Hanf resigned in March.

» FRANK K. YOST has been chosen to head up Independent American Millers' Association for the coming year.

Deaths

» FRANK W. BACON, 76, owner of Pioneer Flour Mills, Tiffin, Ohio, June 21.

» WALTER I. BERG, 53, manager of the Green Bay (Wis.) Canning Co. recently.

» CLARENCE J. BOWERS, 58, meat packer at Marshallville, Ohio, for 32 years, July 1.

» RAYMOND U. BUNKER, 53, a mechanical engineer long associated with the beet sugar industry, July 6, at Walpole, N. H.

There's Something About

Grape-Nuts

REG. U. S. PAT. OFF.

▲ ▲ ▲ ▲ the venerated oldster among prepared cereals, that keeps it as virile and as popular as the newest of its competitors. Cereals have come and cereals have gone, but Grape-nuts keeps its sales-arteries from hardening.

▲ ▲ ▲ ▲ "There's a reason". . . in fact, there are many reasons. The contributing factor that fills us with pride is the KEMP INDUSTRIAL CARBURETOR that *pre-mixes* gas and air for the baking ovens, that gives absolute temperature control, improves working conditions, *saves fuel.*

Grape-nuts keeps up the parade, in merchandising, in advertising, in *production.* If you could wish for better efficiency and lower costs in your roasting, baking, cooking or can-making operations, Kemp of Baltimore is the outfit that can make your wish come true. For details, address **The C. M. Kemp Manufacturing Company, 405 East Oliver Street, Baltimore, Maryland.**

KEMP of BALTIMORE

» JULIUS BREYER, 64, secretary-treasurer of American Syrup & Preserving Co., July 1, at Nashville. He was a past president of Tennessee Canners' Association.

» ALPHA L. EBERHART, 69, former general manager of Jacob Dold Packing Co., at Wichita, Kans., recently.

» JOHN GLOVER, 48, president of Wizard Co., Chicago, and former vice-president of International Baking Co., New York, recently.

» JOHN T. HANDEL, for 28 years superintendent of Ziliak & Schafer Milling Co., Mobile, June 27.

» HERBERT A. HOLMES, 78, president for sixteen years of Bellows Falls (Vt.) Cooperative Creamery, June 23.

» HASTWELL T. MONTGOMERY, 40, formerly Boston division manager of Beech Nut Packing Co., June 29.

» GEORGE C. MORRISON, for 35 years superintendent of the packing division of Swift & Co., June 26. He invented a number of machines used in the meat packing industry.

» GEORGE T. RUSSELL, 58, manager of Intermountain Elevator Co., Longmont, Colo., and former Denver manager for Longmont Farmers' Milling & Elevator Co., recently.

» CURT A. SCHWARTZ, 46, president of Akron (Ohio) Candy Co., June 22.

» WALLACE J. SMITH, 47, vice-president and general manager of LaChoy Food Products, Inc., Detroit, June 19. He was killed by lightning.

» ALFRED C. TURNER, president and treasurer of Newton (Mass.) Pure Food Co., July 2.

Associated Industries

» CATERPILLAR TRACTOR CO., Peoria, Ill., has named Louis B. Neumiller director of industrial relations. The company also has made Leonard J. Fletcher assistant general sales manager and C. M. Burdette manager of the central sales division.

» CONTINENTAL CAN CO. will manufacture crown caps for bottles and cap-sealed cans. The company recently appointed Guy Bollinger as Baltimore district sales manager, packers' cans.

» ROBERT GAYLORD, INC., and Bogalusa Paper Co., Inc., have consolidated to form Gaylord Container Corp.

» GLASCOTE PRODUCTS, INC., Cleveland, has appointed Charles W. Glaser sales representative for the metropolitan New York territory.

» MATHIESON ALKALI WORKS, New York, has appointed Robert M. Mannheim New England district manager with headquarters in Providence, R. I. James R. Harrington will take over Mr. Mannheim's old territory in northern New Jersey.

» NATIONAL CAN CORP. has elected H. L. Buschman, vice-president in charge of the manufacturing division and A. G. Hopkins, vice-president in charge of the equipment division.

» OWENS-ILLINOIS GLASS CO., Toledo, has appointed Stanley J. McGiveran director of advertising.

» WESTINGHOUSE ELECTRIC & MFG. Co., has named H. F. Boe commercial manager, with headquarters in Pittsburgh and New York.

To make FIRST SALES Easier

ONCE a customer has used your product, its quality can speak for itself—repeat sales come automatically. The first sale, however, is difficult. Then the PACKAGE must speak for the product—reflect its quality, modernity and the perfect manner in which you protect it so that it will come to the user in the best condition.

A package improvement that will do these things is a great help in making the important *first* sales.

Our business is to furnish wrapping machines to carry out such improvement at the lowest cost.

The food or drug manufacturer who wants to give his package a smarter appearance or who wants to keep his goods in better condition . . . the candy manufacturer who wishes a package that will display the goods and whet the appetite . . . the tobacco concern that wants an absolutely moisture-proof wrap that will keep cigarettes factory-fresh—all these have obtained the perfect type of wrapping with our machines.

The wide number of models in which these machines are made and the easy adjustability of the machines themselves offer endless opportunities for creating new styles of wrapping.

What can we do for you? Consult our nearest office.

PACKAGE MACHINERY COMPANY, Springfield, Mass.
NEW YORK CHICAGO CLEVELAND LOS ANGELES
Mexico, D. F., Apartado 2303.
Melbourne, Australia: Baker Perkins, Pty., Ltd.
Peterborough, England: Baker Perkins, Ltd.

A few of the many products wrapped on our machines.

PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

How to Treat Wastes
(*Continued from page* 431)

sludge-storage space. Each tank had a side water depth of 6 ft. 6 in. and held approximately 2,900 gal., with 440 gal. of this in the sludge-storage space. Both tanks were constructed of concrete silo blocks and steel bands, and all joints were pointed with cement to assure water tight construction. One of the tanks was equipped with a scum ring, weir and collection trough so that it could be used as a continuous-flow tank. The piping of both tanks was designed to permit the raw waste to discharge near the top center of the tank, and a 2-in. line was located at the top of the sludge hopper to draw off the settled waste. Then a sludge line permitted complete dewatering of the tanks. Control over the amount of waste treated was accomplished through valves in the influent line.

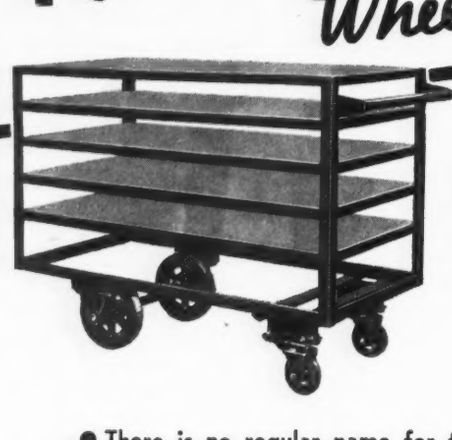
Filtering of the settled waste was accomplished by passing it through crushed stone. This media was contained in two units built of concrete silo blocks and measuring 10 ft. in diameter and 10 ft. in depth, over all. The crushed stone ranged in size from 1 in. to 2½ in. in one filter, and from 2½ in. to 4 in. in the other. Below the crushed stone were patented block underdrains, placed on a 3-in. concrete base which sloped toward the effluent line. The filter media stood 8 ft. in depth, and the additional height of the walls served as a splash board. Liquor from the filter-pump pit was pumped through a 2½-in. line to each filter and distributed over the filter media by a disk distributor operated by the waste discharged from the inlet line. Regulation of the distribution was made by raising or lowering the disk above the orifice of the filter inlet line. The discharge from the filters passed into a weir box, and measurement of the amount of waste passing through each filter was made at this point.

From the filter weir box, the waste being treated flowed by gravity through a 4-in. line to the top center of the secondary settling tank. This tank also was constructed of silo blocks. Measuring 12 ft. in diameter and having an overall depth of 10 ft., the tank had a side water depth of 6 ft. 6 in. Its capacity amounted to 6,500 gal., the settling compartment holding approximately 5,500 gal. and the sludge compartment approximately 1,000 gal. This tank was equipped with a metal scum ring, weir and collection trough which discharged to a concrete weir box. No mechanical sludge drags or scrapers were provided. To permit control of the flow of waste discharged from the plant and the amount returned to the filter pump, the weir box was equipped with baffles and weirs.

To determine the feasibility of operating the sewage treatment plant on the continuous-flow principle, a trial run was made from Sept. 22 to Sept. 28, and during this test no chemicals were added. Functioning under this system, the primary settling tanks afforded a retention period of approximately 2.4 hours, and the secondary settling tank, 1.15 hours. The filters operated at a rate of approximately 30,000,000 gal. per acre per day, with a return rate of three to one.

This trial run with continuous flow gave rise to considerable difficulty as a result of the formation of scum upon the primary settling tanks. And the filter with the small media became clogged on Sept. 28. As a result of this trouble, it was decided to aban-

40 SQUARE FEET OF SHELF SPACE ON Wheels



Can You Use It?

● There is no regular name for this truck, but there are a hundred uses. Call it a "Shelf Truck" and imagine it in your shop or plant — probably most often handling your products at various stages of processing — Quickly, smoothly and steadily rolling on to the next operation.

This Service "Shelf" Truck can be made with many shelves or few, spaced apart according to what you want it to carry — and always the number of shelves multiplies the floor space it covers. In the standard waist-high model shown, the five 2 x 4 foot shelves multiply the 8 square feet to 40 — and the same plan could be used for a truck of any size to fit your special needs — A great boon to a crowded shop, a floor saver, and a work organizer.

Of course, the running gear is Service Frictionless Casters — two swivel, and two rigid — all rubber tired (Enduro) and Alemited. Can you use it? — or one enough different to suit your special needs? Write us.

Service CASTER & TRUCK CO.

525 N. Brownswood Ave., Albion, Michigan

don the idea of continuous flow and resort to chemical precipitation.

So the next part of the experimental run was made with the addition of 5 lb. of lime per 1,000 gal. of waste in the primary settling tanks, these tanks being operated on the draw-and-fill, or batch, principle. The procedure was to allow the waste to stand in a tank for an hour after the lime was added before starting to drain the tank. This was carried on from Sept. 28 to Oct. 16, but beginning Oct. 8 the ratio of the plant effluent returned from the secondary settling tank to the filters was reduced from three to one, to one to one. Filtration was continued at a rate of 30,000,000 gal. per acre per day through the coarse-media filter. The small-media filter was taken out of service as a result of difficulties with it, and because of this change, the retention period in the secondary settling tank was increased to approximately 2.3 hours. Sluffing began in the filter on Oct. 8 and continued until the end of the season. Many filter flies were observed in the filter effluent, although few flies were noticed around the plant.

To get further data on chemical precipitation, ferrous sulphate was added to the primary settling tanks at a rate of $\frac{1}{2}$ lb. per 1,000 gal. of influent from Oct. 16 to Oct. 21. Then the ferrous sulphate dose was increased to $\frac{3}{4}$ lb. per 1,000 gal. on Oct. 21. But all other operating procedures were the same as for earlier periods of the test.

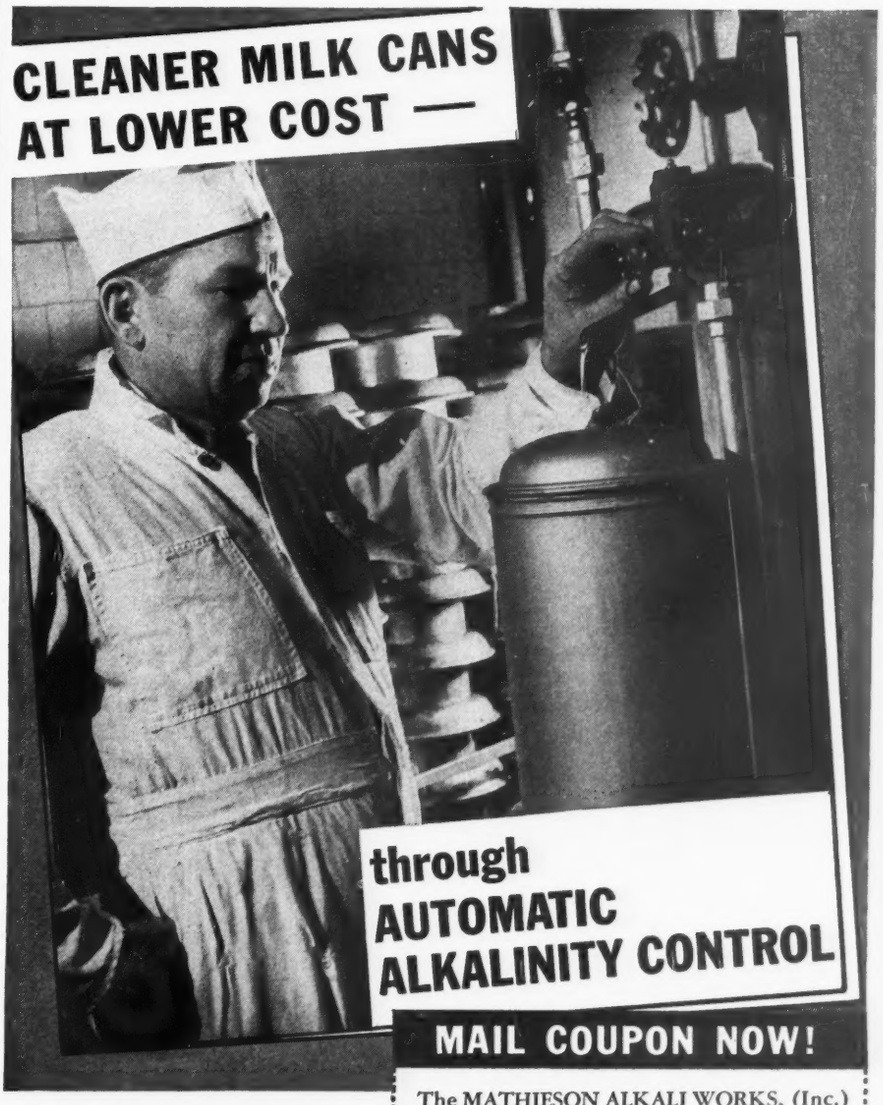
The treatment plant was operated at all times during packing operations at the cannery, and hourly samples were collected. But irregularity of the receipts of tomatoes would not permit daily operation of the cannery, and on days when packing was done, the period of operation varied from six to sixteen hours. The irregularity in the pack may have had some bearing on the effluent.

During the experimental period, 148 composite samples of cannery waste were collected and analyzed. The sampling was done at five points in the plant. Station No. I was located in the raw waste pump pit, samples collected there being representative of the effluent from the screen. Station No. II was on the effluent line from the primary settling tanks; Station III on the effluent line from the small-media filter; Station No. IV on the effluent line from the coarse-media filter, and Station No. V on the effluent line from the secondary settling tank. Because of the condition of the small filter media after four days, sampling was discontinued at Station No. III.

The composite samples were analyzed for dissolved oxygen, biochemical oxygen demand, total and suspended solids, pH, alkalinity and turbidity. The results will be found in Table I and Table II.

It is significant that an increase in the removal of B.O.D. and solids accompanied the addition of lime at the rate of 5 lb. per 1,000 gal. of waste in the primary settling tanks. It is of further significance that even higher efficiencies were obtained by the addition of small amounts of ferrous sulphate.

In some localities, it will therefore, be necessary for canneries to add additional treatment units, possibly high-rate filters and secondary settlers. And canneries located on small streams should build screens and chemical precipitation plants in such a way that secondary treatment can be added later.



MAIL COUPON NOW!

HOW clean your milk cans are washed, how long they remain in service, how much you pay for cleanser—all depend upon how well you control the strength of the solution in your mechanical can washer. This bulletin describes an entirely new automatic alkalinity control that is simple, accurate and thoroughly practical. Send for your copy today and see how easy it is with the Lehmkuhl system to turn out cleaner milk cans at lower cost.

The MATHIESON ALKALI WORKS, (Inc.)
60 East 42nd St., New York, N. Y.

Please send me a copy of your new bulletin, "Cleaner Milk Cans at Lower Cost".

Name .....

Company .....

Address .....

City ..... State .....

Cotton Seed Oil . . .

(*Continued from page* 437)

per cent when the ammonia content of the cake was from 9 to 10 per cent.

Throughout most of the experimental work no effort was made to control the internal pressure in the cooking chamber. This pressure varied from 0 lb. at 230 deg. F. to a maximum of 25 lb. at 270 deg. F. For batches of equal size, the internal pressure varies with the cooking temperature and the total amount of moisture contained in the batch until the amount of moisture is greater than that required to maintain the vapor pressure equivalent to the cooking temperature. No additional amount of moisture will raise the pressure above this point unless the temperature is also increased. It was soon noted that for any given temperature, the internal pressure was constant when the moisture concentration was controlled within close limits.

No beneficial effect was noted through removal of air from the cooker by exhausting the cooker with a vacuum pump as soon as the charging door was closed. No increased yield of oil was recorded for batches subjected to a sudden release of internal pressure on the cooker.

During rolling, the thickness of rolled meats was checked daily with a micrometer caliper and the thickness controlled as nearly as possible to .0075 in.

Considerable experimenting was done in an effort to produce a cake of uniform thickness and density. The difficulty of the cakes having soft ends when dry meats were pressed was overcome to some extent by pulling up on the press cloth as it was folded over so as to form a thicker mass of meats at the ends and make a slightly shorter cake. This was helpful but could not be carried too far because the thick ends interfered with the sliding of the cakes into the press. The cakes were also often thinner at the front than at the rear. This condition was corrected to some extent by slowing up the former buggy on the return stroke. It was later completely overcome by shimming up the bottom plate of the former box at the rear and giving it a uniform slope toward the front so that the front of the box was about $\frac{3}{16}$ in. deeper than the rear. After these changes, press cakes varied less than $\frac{1}{16}$ in. in thickness over their entire area except at the lap.

Little work was done on pressing procedure except to conform with good mill practice. After the first few days, a uniform pressing time of 30 min. was adopted and adhered to throughout the entire experiment. However, some work was done with the rate of application of the pressure. Best results seemed to be obtained with a slow and uniform application of both the high and low pressure. The low pressure choke was regulated so as to require from 5 to 6 min. before the high pressure came on and the high pressure choke was regulated to require a like time to reach the maximum pressure of 4,200 lb. per sq.in., making a total time of from 10 to 12 min. for the application of the maximum pressure.

Also very little was done with respect to refining loss except to make certain that the pressure cooking and the accompanying higher temperatures did not have an adverse effect upon the refining loss.

Generally speaking, so far as oil extraction is concerned, there is practically no choice between processing meats which wield a cake of 8 per cent ammonia content and those which yield a cake of from 9 to 10 per cent ammonia content. From the standpoint of press room capacity, it is of obvious advantage to a mill to operate on a high ammonia content because the volume of meats per ton of seed to be cooked and pressed is much less when the ammonia content is high. The meal can be adjusted to a standard protein content by adding hull bran or if the cake is marketed as such, it might be sold on a protein content basis. The press room capacity is increased approximately 13 per cent with an increase in ammonia content of the cake from 8 to 9 per cent. This is based on purely theoretical figures obtained by comparing the relative weights of 8 per cent cake and 9 per cent cake obtained from a ton of prime seed.

The increase in free fatty acid on the raw meats from the time they were received in the morning until the end of the day was seldom more than 0.1 per cent. To check this matter further, 200 lb. of the rolled meats were placed in a metal can and allowed to stand for two months in a corner near the cooker where the temperature was always relatively high. The F.F.A. (free fatty acid content) was checked periodically. The moisture content of the meats when received was 9.3 per cent. The following table shows the increase in F.F.A. with the time storage on cottonseed meats received from Rome Oil Co. mill at Rome, Ga.

Time	Per Cent F.F.A.
When received	.9
After 2 days	1.1
After 5 days	1.35
After 8 days	3.55
After 12 days	5.0
After 19 days	8.8

It is of no particular interest that at the end of 60 days the per cent of F.F.A. was 30.6.

The net results of the test runs were that cooking meats under a pressure of about 25 lb. per sq.in. and at a temperature of 270 deg. F. gave an increased yield of oil providing the moisture content was accurately controlled between definite limits of $4\frac{1}{2}$ to $5\frac{1}{2}$ per cent for the meats to give a press cake with 7 to 8 per cent moisture content. Also the time of cooking could be cut to as much as one-fourth that commonly used. The oil produced was considerably better than standard in color and quality, and the cake was a light, bright color of first quality.

Freedom from Infection . . .

(*Continued from page* 439)

open equipment such as tables, trays and troughs in which food is handled, where the actual working surfaces are smooth and polished, but where the supports beneath are nearly impossible to clean. Many of the equipment manufacturers are recognizing this defect, and they are making great efforts to correct it.

Equipment such as tanks, pipe lines, conveyors and trucks used for containing food products, should as far as possible be built of corrosion resisting materials. This is the case not only because of the necessity for preventing corrosion by the product itself, but more particularly to resist corrosion by bactericides. Often steam and hot water are used for sterilizing to avoid corrosion, but generally speaking chemical sterilization will prove cheaper. In any case, it is frequently desirable to use chemical sterilization as well as heat.

The surfaces of equipment should be smooth and preferably polished. It is well known that polished surfaces are more resistant to corrosion than rough ones, and in addition they are much easier to clean. Furthermore, the surfaces should be without cracks or pits.

A good positive drainage for every minutest part of the equipment is most important. Even though the

equipment is built for use with solids, proper drainage must be provided so that when the apparatus is washed and sterilized the wash water and sterilizing solution will drain completely.

Valves offer a special problem, and before adopting a valve it should be examined carefully to see that there are no pockets which will not drain or crevices where the product may lodge. The plug cock is excellent in small sizes, where it can be used, because it has no packing. But the larger sizes are difficult to operate, and the sanitary-type packed valve must be used. The packing in such a valve is the greatest hazard to its sterility, as it is never possible to keep the product from soaking into the packing. Non-porous packing and packing that will withstand frequent sterilization with steam should be used for this reason.

Packings are important at many other points—in fact, wherever they occur—as on pumps, propeller shafts, mixers and agitators of various kinds. They can be most troublesome on pumps, because the colonies may form in a period of shut-down and be slowly fed into the products by the rotation of the shaft. This is sometimes successfully overcome by running a small steam line to the stuffing box and steaming out thoroughly before and after each period of operation (Fig. 3).

Other details could be enumerated at great length, but throughout there is one simple principle which always applies: Prevent the possible formation of bacterial colonies through careful design, allow no place for bacterial colonies to form and then provide for sterilization of every part of the machine.

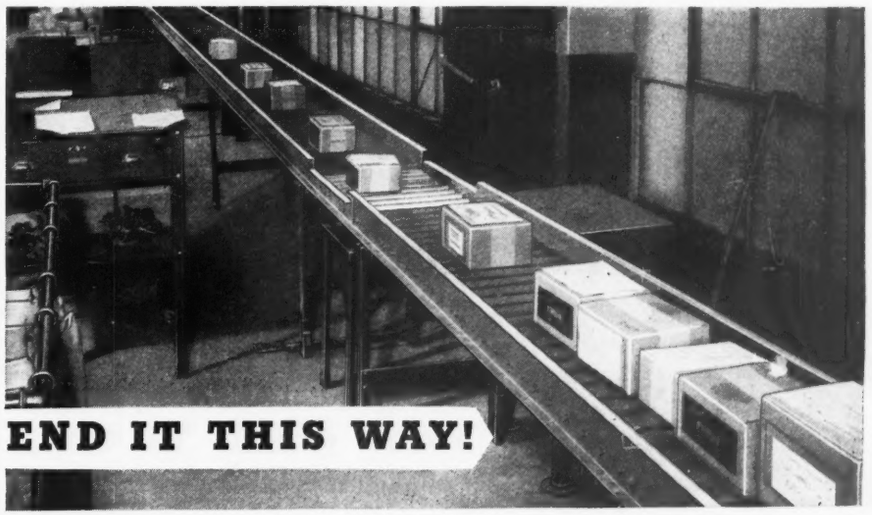
The increasing use of automatic machinery makes the application of this principle much more difficult, but at the same time the more necessary. Of the many parts which go to make up an automatic machine, many which are in contact with the product are objectionable because of their intricacy. They are, in short, difficult or impossible to clean. Yet automatic machinery offers so many economies and advantages that it must be used. Not the least of these advantages is that it reduces hand handling. If the machine is suitably designed to meet the requirements of sterilization, it can be far more help than hindrance in the cause of sanitation.

Such was the case with an automatic filling machine to be used for sterile bottling. It was suitable with modifications, but many of the working parts had to be redesigned so that they could be taken apart easily for cleaning and to eliminate exposed screw threads, gaskets and packings. Typical mechanical details which may be changed to advantage are shown in Fig. 4.

People, of all things, carry with them the greatest assortment of unpleasant micro-organisms. It is not ordinarily customary to require them to bathe, although in some plants they must wash before starting to work. Yet these same people work over the food and in the food. With some products this cannot be avoided. In these cases the least that can be done is to require frequent change of uniforms and frequent washing.

There are many cases, however, where arrangements can be made to keep employees from touching food directly, and where possible this should be done. The personal touch

Is production speed s-l-o-w-e-d up by "*Bottle Necks*"?



Millions of sticks of chewing gum moved in endless flow by Lamson Conveyors at the American Chicle Company's plant.

Slow-spots—the "bottle necks" that hold up the steady flow of materials in process—are costly in any production line. Nearly every food plant has one or more.

Lamson engineers have helped hundreds of food plants to end "bottle necks" . . . have worked out fast, "straight line" routings that keep materials moving steadily through troublesome spots. With 50 years of conveying experience behind them, our engineers know and recommend the short cuts to both efficiency and economy. And they have at their command the most modern, the most complete line of conveying equipment in the world.

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in some things is excellent but not in food. Machine operators often can use special tools. Such tools can be kept free from infection by frequent rinsing in a mild sterilizing solution or in boiling water, as is done with knives in many packing houses.

A contributory factor in maintaining aseptic conditions is an ample supply of clean water. Strongly chlorinated water, of say 30-100 parts per million, is excellent for general cleaning and rinsing, but it should be followed with a rinse of a weaker solution. Most equipment will not stand the strong solution for long, even when corrosion inhibitors are used. But solutions of ½ to 1½ parts per million, while sterile, have very little corrosive action and may be used as a final rinse.

Success in keeping a plant free from infection, after the proper design has been completed, depends on the maintenance of an adequate schedule of cleaning and sterilizing. A cleaning log similar to a lubrication chart or an engineer's log should be kept, and on this should appear each individual operation of cleaning and sterilizing. In larger plants, it is usually advisable to have one man spend all his time checking up on this work, and when a very high degree of freedom from contamination of equipment is necessary, the bacteriologist must make spot checks at various points to see that equipment is being properly maintained.

It Cuts, It "Grinds," It Mixes

(*Continued from page* 441)

liquor and is ready for the refiner.

In meat cutting by prior methods it is necessary to defrost any frozen meats. Then it is customary to cut the chunks to convenient size to run through a large sausage grinder with about 1-in. holes in the plate. This coarse-cut material is next put through another grinder with much smaller holes, or through a "silent" cutter which reduces it to the desired degree of fineness. All of this requires about 40 minutes. Then the batch must be mixed. In contrast to the four foregoing steps of defrosting, two successive grindings and the mixing operation, the new machine will take frozen meat as easily as unfrozen, and will take any size of piece that would ordinarily find its best use in sausage or meat loaf.

In sausage cutting it is important that the temperature of the batch be kept down because, once the meat gets warmed up, it is impossible to cool down a large mass of finely cut meat before bacterial spoilage will start in the interior, with consequent off-flavors. Crushed ice is usually fed into the meat during fine grinding to reduce the temperature and at the same time to bring the product to the right consistency by supplying water for the meat to absorb. This is done also with the Roto-Cut, the operator putting the crushed ice into the running machine by the shovelful. However, the tendency of the temperature to rise due to the heat generated by the cutting action is comparatively little with this machine because of the relatively short cutting time

In preparing sausage with this machine, the various seasoning ingredients, like spices, are added from pans or bags by the operator on the control side, and everything is thoroughly mixed before the machine is discharged, the mixing going on simultaneously with the cutting. Independent mixing of peppers, fats, pickles and so forth can be done where desired by raising the knives and using the machine as a mixer only.

The machine is too new to have had tests made on all its possible applications. If it will operate satisfactorily on cocoa beans when equipped with saws instead of knives, it might possibly also work on coffee as a new kind of grinder. Cutting of pickled vegetables for relishes seems to be a "natural" for it; likewise the cutting of fruit and subsequent mixing for mince meat. Several of these machines have been in regular operation for some time on mince meat, relishes, vegetables and so forth, with extremely satisfactory results. An important characteristic of the machine is that it cuts but does not crush or mash.

Letters To The Editor

Wrappers for Processed Cheese

Madison, Wis.—In the July issue of *Food Industries* on page 423 you have presented a very interesting digest of the paper, "Wrappers For Processed Cheese." In writing this paper, I indicated that England requires tin foil to be coated with protective enamel similar to that used for the interior of tin cans.

Since this paper has appeared in print, I have received a very interesting communication from Mr. J. T. Minster of the Dominion Dairy Company, Ltd., Aylesbury, England, in which he points out that actually England does not require the foil to be coated, but that the maximum permissible tin content of the food stuffs has been set at two grains per pound. In order to be certain that the tin content of processed cheese wrapped in tin foil would stay below this limit, the manufacturers of England have used a coated foil. While it is rather doubtful if freshly prepared processed cheese would contain the above amount of tin, there is always the possibility that some retailer would have some cheese on hand for a rather long period of time, and if this were taken for analysis by the authorities, it is quite probable the tin content might exceed the maximum set.

Thus, in order to avoid any unfavorable publicity which would certainly result from such findings of excessive amounts of tin, the manufacturers have resorted to the use of coated foil. According to my correspondent, the use of the coated foil has been very successful in preventing blackening of the tin foil and at the same time it has kept the tin content of the processed cheese to a very low level.

I am bringing this information to your attention in order to correct an error which I made in the original paper.—HUGH L. TEMPLETON, *Department of Dairy Industry, College of Agriculture, University of Wisconsin.*

Overcaution

Letters from readers are some of the most enjoyable features of an editorial job, whether they be requests, suggestions, josh, reprimands, or ordinary friendly chatter and gossip. We like them.

However, those who have never met the members of our editorial staff or have never had personal contact with a reputable publishing house, seem very reluctant to communicate their views in writing. And about twice a week somebody writes us signing his name but giving no address, fearing apparently that his letter will be published. While it is our practice to answer all letters, the number of answers which are returned by the post office because of insufficient address is becoming disheartening.

For the benefit of the cautious, we state that letters are never published without the writer's consent, except when it is plainly stated that the letter is for publication.—EDITOR.

(*Continued from page* 458)

FATS & OILS

Hardening Fats

IN A STUDY of the high pressure hydrogenation of unsaturated oils to form solid fats, a number of catalysts were compared in experiments with soy bean, sardine and herring oils. Mixed catalysts were employed, for example copper - nickel, manganese - copper, cobalt-copper and like pairs. Some of the catalysts were reduced with hydrogen before use, for comparison with the unreduced catalysts. With soy bean oil the most effective catalyst was unreduced copper-nickel with 70 per cent copper and 30 per cent nickel. Either more or less copper than the stated proportion makes the catalyst less potent.

With sardine and herring oils, on the other hand, reduced catalysts were more effective, and those containing nickel were superior to such couples as manganese-copper, cobalt-copper and the like. A peculiar feature of the action of a copper carbonate catalyst is that a large yield of iso-oleic acid is obtained in hydrogenating sardine and herring oils. The catalytic hardening was carried out under a pressure of 30 atmospheres at 180 deg. C. (356 deg. F.). The reaction time was 40 minutes in each experiment.

Digest from "High Pressure Hydrogenation of Fatty Oils Over Mixed Catalysts with High Copper Content," by Ryosei Koyama, *Journal of the Society of Chemical Industry (Japan)* 40, 25B. 1937.

MEATS & FISH

To Prevent Splitting of Artificial Sausage Casings

OVERCOMING A COMMON DEFECT in artificial sausage casings, namely lack of resistance to tearing crosswise, a new cellulosic sausage casing is made with transverse strength actually exceeding its longitudinal strength. As disclosed in British Patent 458,535 (granted March 18, 1937 to Wolff & Co., Kommandit-Ges, auf. Aktien, Walsrode, Germany) the new casings may be made of paper or of a structureless cellulosic wrapping foil. If there are fibers with longitudinal orientation, the paper is bent and cemented in such a way that the fiber direction is transverse to the length of the tube. If there is no orientation, the paper or foil may be coated with a cellulose solution having its micelles arranged transversely. Two foils or paper sheets may be laminated with their fiber or micelle arrangement perpendicular to each other, or three layers may be laminated with the center layer oriented perpendicular to the other two. Any one of these expedients permits production of adequately strong casings from inexpensive materials.

Spoilage of Fresh Fish— Natural Ice Dangerous

THOUGH THIS IS NOT A COMPLETE BIBLIOGRAPHY of the bacteriology of fish, it is a splendid review of the most important scientific literature on the subject, covering the following aspects: Bacteria on the surface of fish; on the gills; in the intestines and viscera; in the fish flesh; occurrence of *B. coli* and coliform organisms in fish; attempts to control spoilage of marine fish.

One of the interesting bits is the long forgotten statement of R. W. Tower, made back in 1899: "The researches of Fraenkel, Bordoin, Uffreduzzi, Prudden, and Heyroth show us that natural ice may contain both putrefactive and pathogenic bacteria. This fact alone should teach us to look with suspicion upon any meat that has been brought in direct contact with ice of unknown origin, especially when the ice is allowed to melt so that the drip soaks into the flesh. Unfortunately Tower's

In one plant we know it cost only .0018 of a CENT per BARREL to eliminate this costly pest

This flour producer has overcome his losses from insect infestation by fumigating his plant with LIQUID HCN four times a year. When this 2500-barrel mill operates at capacity for 200 days a year, the annual cost is only 18/100 cent per barrel—an insignificant expenditure to effect great savings.

Another food company, producing prepared cake and flour mixtures, uses HCN in its vacuum chamber fumigation. The chamber is loaded with 40,000 pounds of the packaged product at a time.

In this plant a complete kill of all insects and their larvae is obtained at a cost of 15/1000 cent per pound of packaged product.

Neither of these two companies has sustained losses from insect infestation nor have there been returns on insect-infested products.

If you handle flour, rice, raisins, dates, figs, nuts, cacao or other food products subject to insect infestation, why not write us for an estimate of the cost of obtaining a complete kill of destructive pests.

LIQUID HCN is an all-purpose pest destroyer. It is a powerful, concentrated, economical and efficient fumigant, completely controls all insects which infest stored products, and kills rats and mice.

As the only manufacturer of HCN in all its modern forms – including LIQUID HCN (commercially pure), ZYKLON DISCOIDS and CYANOGAS – American Cyanamid is in position to render a complete and valuable service.

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KANSAS CITY MO. AZUSA, CALIF.

work and recommendations have long been forgotten."

Digest from "A Review of the Bacteriology of Fresh Marine-Fishery Products," by Francis P. Griffiths. *Food Research*, 2, 121, 1937.

MISCELLANEOUS

Staling of Coffee

WHATEVER IT IS IN COFFEE that gives it its pleasant odor must occur in extremely small amounts and be capable of scenting huge amounts of material. This makes it difficult to discover exactly what takes place when roasted coffee grows stale.

Roasted coffee kept in a moist atmosphere was absolutely lacking in coffee flavor; when kept six weeks in a dry atmosphere it lost but little flavor, and could not be classed as stale. The fat in coffee does not become rancid in the relatively short time it takes for coffee to become stale.

An ether extract of coffee brew was found to contain diacetyl, alcohol, acetic acid, furfuryl acetate, furfuryl alcohol, an unidentified viscous material, and a fairly fluid material that was probably a phenol. Furfuryl alcohol is very unstable in the presence of an acid and if the entire mixture of extracted materials was held for a short time it darkened. If exposed to air is changed noticeably over night. But sealed in vacuum the change was much retarded. This parallels the keeping of roasted coffee in a vacuum and leads to the conclusion that the foregoing mixture of extracted substances plays an important part in the staleness of coffee. Any group of compounds other than fat can be responsible for staleness of coffee.

Digest from "The Staling of Coffee," by S. C. Prescott, R. L. Emerson, and L. V. Peakes, Jr. *Food Research*, 2, 1 1937.

More Information on The Staling of Coffee

IN THIS ARTICLE, the previous discussions (*Food Research* 2, 1, 1937) are continued. The following further substances have been identified in roasted coffee: 1. Kahweol, 2. Diacetyl, 3. Diethylketone, 4. Vanillone, 5. p-Vinyl guiacol, 6. Guiacol, 7. n-Heptacosane, 8. p-Vinyl catechol, 9. Sylvestrene, 10. Eugenol, 11. A hydro carbon of melting point 116-117 deg. C.

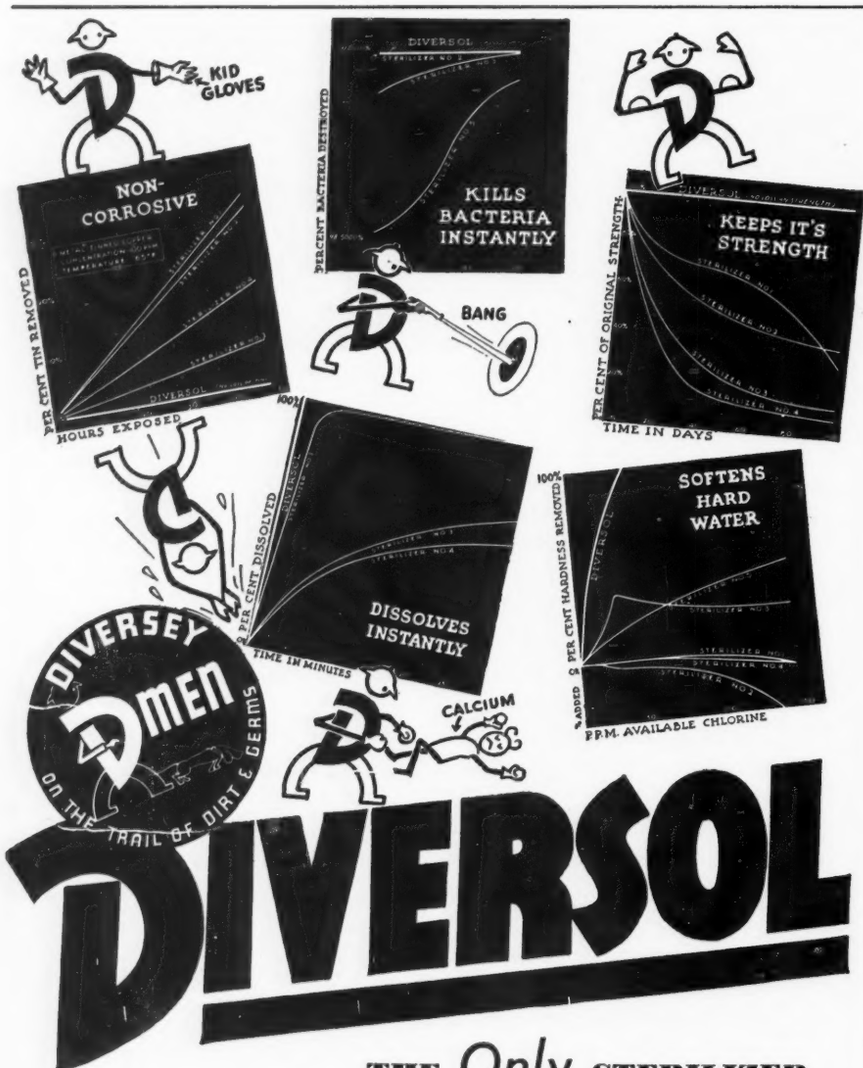
The mild scientific controversy over the relative merits of the proper method to distribute coffee is advanced to a further stage by this quotation: "It seems extremely improbable that changes in the flavor or aroma of coffee, known as staling, are to be wholly attributed to oxidation and consequent rancidity of the fats. The evidence indicates that the fats are not responsible for either flavor or aroma—indeed we have obtained fat-free coffee extracts in this work which passed a rich, full coffee odor."

And the following: "It is possible indeed that they (the unsaturated fats) act as oxygen carriers by way of their unstable intermediate oxidation products and so oxidize substances of the types mentioned (Nos. 5, 6, furfuryl alcohol and other unstable substances)".

Digest from "The Staling of Coffee, II," by Prescott, Emerson, Woodward, and Heggie. *Food Research* 2, 165, 1937.

Sugar from Starch

SUGAR which is useful in making jams or chocolate products, and can also be employed to good advantage for accelerating dough fermentation, is made by controlled acid saccharification of potato starch or cereal starches. Procedures for the saccharification are described in French Patents 803,298 and 805,695 (granted Sept. 26 and Nov. 26, 1936, to Patent Co., Ltd.). By stopping the acid treatment at the dextrine stage, adding 2—3 per cent of a malt extract and heating at 122—140 deg. F. for about six hours, the starch is largely



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LABORATORY check-ups . . . as reported in the charts shown above . . . confirm the all-around superiority of Diversol. Diversol is the only quick-acting sterilizer that will not corrode equipment. It is easy to use . . . dissolves instantly and completely in hot or cold water . . . never loses its sterilizing strength. Diversol assures low bacteria counts . . . freedom from metallic off-tastes and flavors . . . efficient and economical sterilizing results in the dairy and creamery, the cheese factory and other food plants. For further details send for circular "Charting a Course to More Efficient Sterilization."

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converted to maltose. The resulting solution, after filtration, can be used in brewing, or as a yeast nutrient. By vacuum evaporation it yields a sugar which can be used in jams and confections. The original solution, without evaporation, can be added to dough to hasten the fermentation process.

Germicidal Properties Of Chlorine Compounds

WHILE THIS PUBLICATION is of greatest interest to the bacteriologist engaged in disinfection studies, it has considerable usefulness to the man in the control laboratory, particularly in plants where disinfectants are used to sterilize pipe lines, bottles and equipment. Compounds tested included chloramine, chloramine-T, hypochlorites and commercial patented products "Perchloron" and "H.T.H." Too voluminous (60 pages) to digest in limited space, only the final conclusion is quoted.

"In disinfection with hypochlorites, the germicidal efficiencies obtained, together with evidence from the nature of the survivor-curves, support the contention that undissociated hypochlorous acid is the most important germicidal agent. In disinfection with the simple 'chloramines,' or with the organic chloramine compound chloramine-T, it appears that hypochlorous acid does not play the significant role. In both the 'chloramines,' and hypochlorites, the chlorine atoms are positively charged. The disinfecting action of these compounds appears to be due primarily to this positive chlorine atom."

Digest from "Germicidal Properties of Chlorine Compounds," by Charlton & Levine. *Iowa Engineering Experiment Station Bulletin No. 132*, 1937.

Flavors

THE COMPLETE PAPERS from the symposium on Flavors in Foods of the American Chemical Society spring meeting will be published in Vol. 2, No. 3, *Food Research*. This meeting was reported in condensed form in June, 1937 FOOD INDUSTRIES, page 314.

Preserving Perishable Fruits By Ultraviolet Rays

ACCORDING TO RESULTS OBTAINED in an experimental study at the Federal Experiment Station for Forestry and Horticulture, at Waedenswill, Switzerland, the ultraviolet irradiation method can be successfully used to improve the keeping qualities of perishable fruits and vegetables. The tests were made with tomatoes, strawberries and peaches. The test specimens were exposed to ultraviolet light at 4 deg. C. (39 deg. F.) Spoilage losses were much decreased over the periods of time in which it is commercially important to keep the products fresh.

The test results point to a new and useful application of ultraviolet irradiation, which has been employed to obtain entirely different effects (such as vitamin enrichment) in other food products. Since not even X-rays can destroy spores and mycelia which have penetrated deep into the interior of fruits, it is not to be expected that ultraviolet light could actually effect sterilization but there is much benefit in stabilizing perishable products even for the short periods required for transportation and marketing.

Digest from "Ultraviolet Irradiation of Perishable Goods," by K. Meier and A. V. Grampoloff. *Landwirtschaftliches Jahrbuch der Schweiz* 50, 951, 1936. (Published in Switzerland.)

Chemical Composition of Avocado Fruits

A PAPER presenting data regarding the occurrence and distribution of sodium, potassium, phosphate, iron, manganese, copper, calcium, nitrogen, sulphur and chlorine in the fruit of the avocado.

Digest from "Chemical Composition of Avocado Fruits," by A. R. C. Haas. *Journal of Agricultural Research*, 54, 669, 1937.

EXPANDING PRODUCTION

by Continuous Flow

IN many plants where Mathews engineers have installed continuous flow equipment, raw materials start at the top of multi-storied buildings and flow downward through all of the succeeding processes.

One reason why Mathews engineers are able to unify plant operations, no matter how diversified, is that they are trained to see production as just one process from start to finish.

Placing all processes in logical sequence so that materials travel continuously in one direction is the dominant principle in all modern manufacturing.

This principle applies especially in the packaged food industries. Filling, sealing, labeling, packing operations, etc., are kept continuous. Equipment operates at highest efficiency *when all these processes are integrated* by Mathews conveyers, and continuous flow extends to sorting, storing and shipping.

A Mathews survey by trained production engineers almost always reveals new opportunities for lowering costs, expanding output, eliminating bottlenecks and lost motion. Mathews engineers are located in 29 industrial centers.

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BOOKS RECEIVED

ALMANAC OF THE CANNING INDUSTRY FOR 1937. Published by *The Canning Trade*, 20 S. Gay St., Baltimore, Md. 258 pp., 6⅛x9 in.; paper. Price $1.

Federal food laws with amendments and new rulings, federal and state grading and labeling specifications, can and shipping container styles and sizes, and miscellaneous statistical data are among the handy reference compilations contained in this annual supplement to *The Canning Trade*. During recent years this supplement has been steadily growing in size; this 22d edition is 32 pp. larger than last year's issue.

As an aid to packers it includes a buyers guide for machinery and supplies and a directory of canned food brokers. For wholesale grocers and brokers it lists under appropriate headings the canners of various kinds of fruits and vegetables.

WROUGHT IRON. By James Aston and Edward B. Story. Published by A. M. Byers Co., Pittsburgh, Pa. 1936. 60 pp. 6¼x9¼ in.; cloth; illustrated. Price $1.

Although known for its durability, workability, and resistance to ordinary corrosion wrought iron has not been occupying the limelight during the past years as other and newer types of iron containing materials have.

As metallurgists expert in the manufacture and familiar with the characteristics and applications of wrought iron the authors seek to acquaint fabricators and others who specify or use materials of construction with up-to-date information on this age-old metal.

In food manufacture wrought iron plays its part in brine and ammonia refrigerating lines and coils, hot and cold water lines and tanks, condenser pans, cooling towers, yeast tubs, beer cooling tanks, and sewer lines.

SUGAR; A CASE STUDY OF GOVERNMENT CONTROL. By John E. Dalton, member of faculty, Harvard Graduate School of Business Administration. Published by Macmillan Co., 60 Fifth Ave., New York, N. Y. 311 pp.; 6x8⅞ in.; cloth. Price $3.

As former chief of the sugar section of AAA, the author knows about government regulation of industry from first-hand experience. And in his book he discusses some of the advantages and limitations of rigorous government control, setting these down in general terms so that they apply to the mixing of politics with economic problems in any industry. As a background, the book covers the pre-war assistance given to the sugar industry, the origin of the world sugar depression, and the subsequent development and administration of the control scheme of 1934 and its effects upon producers and consumers. The form that future control of sugar may take is analyzed.

ANNUAL REVIEW OF BIOCHEMISTRY, VOL. IV. James Murray Luck, Stanford University, Editor. Published by Annual Review of Biochemistry, Ltd., Stanford University, P. O., Calif. 1937. 708 pp.; 6½x9 in.; cloth. Price, $5.

Reviews of the recent literature on various subjects of importance to scientists in the food field are included in this voluminous work. Among these subjects are enzymes, the application of microchemistry to biochemical analysis, the chemistry of the carbohydrates and the glycosides, the chemistry of lipins, the chemistry of steroids, the chemistry of proteins and amino acids, the vitamins and nutrition. To give an idea of the scope of the Review, in the chapter, Application of Microchemistry to Biochemical Analysis, there are 237 references to literature on the subject. This volume of the Review differs from its predecessors in that it has a subject index.

PATENTS

Yeast Grown to Have an Invertase Content Several Times That of Normal Yeast—Alfred Schultz to Standard Brands, Inc., New York, N.Y. No. 2,079,634. May 11, 1937.

Vegetables and Vegetable Proteins Put Into Dry Powdered Form and Mixed With Small Amount of Sodium Nitrite for Use as a Soup Mixture—Hugh E. Allen, one-half to Albert G. McCaleb, Evanston, Ill. No. 2,079,649. May 11, 1937.

Food Quick-Frozen During Passage Through an Elongated Chamber Into Which Is Sprayed a Refrigerant in Finely Divided Form—Mikail T. Zarotschenzeff, New York, N.Y. to "Z" Processes, Inc., Jersey City, N.J. No. 2,080,103. May 11, 1937.

Making of Wine Speeded up by Treatment With Finely Divided Pulp of White Oak Wood Moistened With a Solution Containing an Emulsin Complex—Ernst T. Krebs, San Francisco, Calif. No. 2,080,138. May 11, 1937.

Hearth Breads Held to a Definite Length During Proofing and Baking by a Portable Supporting Plate With Sides to Restrict Expansion of Loaf in Longitudinal Direction—Ausborn M. Bradley and George E. Watson, Detroit, Mich. to Bakeries Service Corp., New York, N. Y. No. 2,080,162. May 11, 1937.

Foods Protected Against Deterioration Through Insect Infestation by Method Which Prevents Packing of Non-Condensible and Non-Fumigating Gases in Spaces Between Particles of a Bulk Product—Charles J. Merriam, Winnetka, and Russell Wiles, Chicago, Ill. to Guardite Corporation. No. 2,080,179. May 11, 1937.

Shellfish Flesh Freed From Chitin Through the Aid of Ultra-Violet Ray—Eugene C. Gibson, Springfield, Pa. No. 2,080,263. May 11, 1937.

Cutting of Individual Wrappers From a Continuous Web of Wrapping Material Controlled Through the Aid of Photoelectric Cell—George R. Webber, Palisades, N.J. to Standard Brands, Inc., New York, N.Y. No. 2,080,292. May 11, 1937.

Wort Extracted From Malted Grains which Form a Filtering Bed and Permit Uniform Contact of Liquid to All of Grain as It Passes Downward Through Grain Bed—Edmund Mayer, Ulm A. D. Germany. No. 2,080,287. May 11, 1937.

Milk Handled in a Series of Narrow Jacketed Tanks Arranged Side by Side Having a Common Casing for Each Series, and an Agitating Device Which Spans Each Series of Tanks But Is Adjustable for Selective Agitation of Contents of Individual Tanks in a Series—Edwin Hauk, one-half to Marion L. Crouch and Orpha M. Crouch, Milwaukee, Wis. No. 2,080,370. May 11, 1937.

Milk Pasteurized in a Rectangular Vat Having Outer Heat-Conducting Walls and a Vertical Stationary Central Heat-Conducting Wall Heated by a Film of Liquid Flowing Over the Outer Surfaces of the Outer and Central Walls of Vat—Harvey Feldmeier, Little Falls, N. Y., deceased, to Cherry-Burrell Corp., Wilmington, Del. No. 2,080,537. May 18, 1937.

Fruit Juices Freed From Arsenical Impurities by Treatment With Acetic Acid, Tannic Acid and Ferric-Hydroxide—Victor E. Speas and Nathan Mnookin to Speas Manufacturing Co., Kansas City, Mo. No. 2,080,582. May 18, 1937.

Bread Dough Twisted by Mechanical Means Before Panning—Frank Streich, one-third to Caleb H. Canby, Jr, and one-third to H. Hoyt Thompson, Chicago, Ill. No. 2,080,584. May 18, 1937.

Confections Frozen in Mold Having a Crate-Like Frame and Consisting of a Pan With Pockets Arranged in Longitudinal and Transverse Rows—Albert C. Grunwald, River Forest, Ill., to Precision Metal Workers, Chicago, Ill., No. 2,080,816. May 18, 1937.

Flour Treated During Passage Through an Upright Unit With Inlet at One End, Discharge at Opposite End, and Means for Changing Direction of Flow of Flour as Well as For Shaking Entire Treating Unit—Edwin F. Anderson, Buffalo, N. Y. to Pillsbury Flour Mills Co., Minneapolis, Minn. No. 2,080,884. May 18, 1937.

Frozen Confection Made by Subjecting a Frozen Core of Normally Liquid Mass to a Confined Liquid Flavoring Material and Freezing so that Flavoring Material is Concentrated on Outside of Confection—Harry P. Ingalls, Berwyn, Ill. One-half to Ellwood F. Witchurch, Chicago, Ill. No. 2,080,920. May 18, 1937.

Candies of Different Kinds Mechanically Packed to Give a Predetermined Mixture Content to Package When Completed—George C. Miller, Brighton, Mass. to Excelsior Machine Corp. No. 2,081,093. May 18, 1937.

Hard and Soft Cheese Mixture Made Into Plastic Cheese Mass by Addition of Water Solution of a Small Quantity of Alkaline Polyphosphate to the Hard Cheese and Heating Mass to About 80 to 100 Deg. C. Under Less Than Atmospheric Pressure—Frederich Hoermann von und zu Guttenberg, Dusseldorf and Helmut Firgau, Dusseldorf-Oberkassel, Germany, to Henkel & Cie G.m. b.H. Dusseldorf-Holthausen, Germany. No. 2,081,273. May 25, 1937.

Flavor of Baked Food Products Improved Through the Addition of Acetyl-Methyl-Carbinol to Usual Ingredients—Franciscus Visser't Hooft and Frederik Johan Gerrit de Leeuw to Lucidol Corp., Buffalo, N. Y. No. 2,081,343. May 25, 1937.

Confections Mechanically Coated to Give a Bottom as Well as a Top Covering—Wilfred T. Birdsall to Eskimo Pie Corp., New York, N. Y. No. 2,081,888. May 25, 1937.

Wort for Malt Beverages Freed From Solids and Clarified by Addition of Finely Divided Absorptive Filter-Aid Material Prior to Filtration—Frederick P. Siebel, Chicago, Ill. No. 2,082,222. June 1, 1937.

America's Largest Milk Plant

The Borden Company marks its 80th Anniversary by opening a fluid milk plant designed to be the most economical in the United States. Experiences of 80 years are combined in this plant with many innovations created by the Borden Engineering Department. ~ ~ ~ ~ ~

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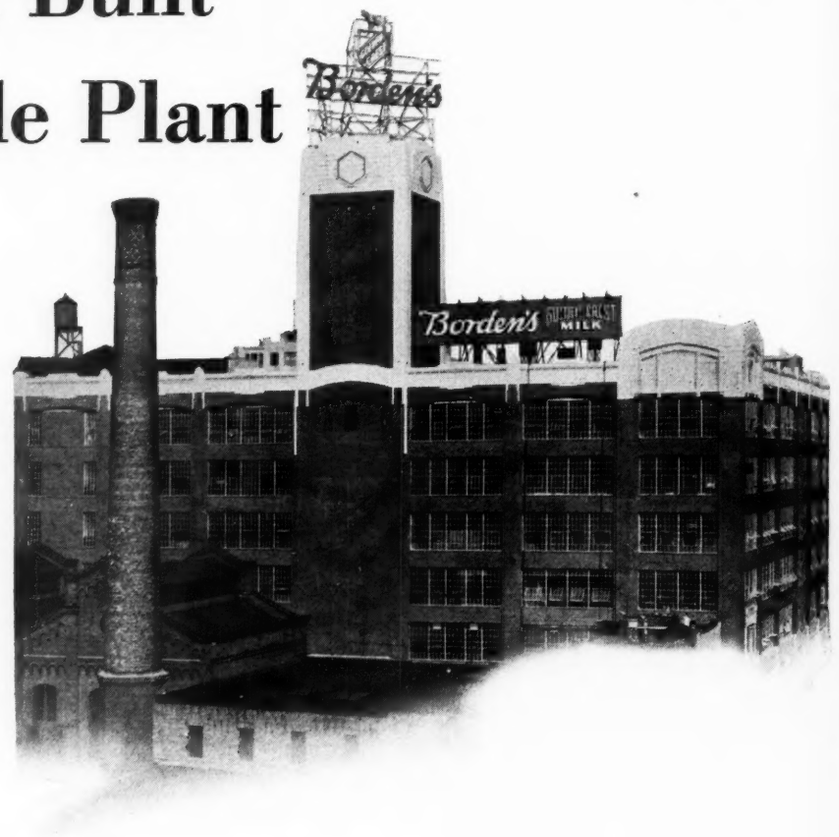
Why Borden Built The Riverside Plant

By H. A. CRONK
President, Borden's Farm Products Division, The Borden Company



FROM THE STANDPOINT of engineering achievement, the new Riverside plant of Borden's Farm Products Division is a distinct advance in the industry and may be regarded as unsurpassed in that respect. Quite naturally, those of us associated with the enterprise enjoy a deep-seated pride and sense of accomplishment in the realization of our Engineering and Planning Department's latest masterpiece.

But the physical features of the plant are not the only important elements. The economic benefits derived are of considerable moment. There has been much talk about the spread between the price the farmer receives for milk and the price the consumer pays for milk. Consumers, politicians and others have exerted constant pressure to bring a reduction of that spread. The company recognizes the public desire and is not unmindful of its obligation to bend every effort in that direction. It long has recognized that the sound way of reducing the spread would be by effecting economies in the processing and distribution of milk.

Consolidation of operations affords an important means of achieving economy. Advanced engineering technology, modernized equipment and improved distribution are complementary items in this program. These are the avenues through which the goal of economy may be attained.

Spread cannot be reduced otherwise. Certainly it is not to be achieved at the cost of thinning the pay envelope. Indeed, the company just now has added considerably to the pay envelope. The necessary economy leading toward reduction of the spread must come in the field of operations. In bringing together several separated branches an economy has been realized which it is hoped will bear appreciable results.

The physical aspects of consolidation, advanced technology, modernized equipment and improved distribution will be in review before the visitor to Riverside. He will have occasion, too, to note the considerate working conditions that have been created.

Air-conditioned locker rooms, showers, coffee room and other facilities have been provided for employees. Elaborate measures have been taken for their safety and, too, for the safety of pedestrians on the two streets on which the plant fronts. Ten special policemen, working in shifts, will stand guard at entrances and exits, an important precaution with several hundred vehicles passing in and out of the building daily.

A SPECIAL SYSTEM of automatic signals has been contrived in the interests of safety.

Nowhere else has a milk plant gone in so extensively for noise abatement. Here the company carries forward its policy of rubber tires for vehicles and rubber shoes for horses.

The public relations element in a plant of the size and nature of Riverside is important not only to Borden's Farm Products Division, but to the entire milk industry. Visitors observing here the rigorous sanitary conditions maintained, the precision of operations and their complexity must be impressed with the great trouble and cost of health assurance. Perhaps the consumer's observations will explain to him, more than hundreds of pages can, the reason for the spread that exists in prices paid to the farmer and paid by the consumer.

Two anniversaries make this a peculiarly happy year in which to open such a plant as Riverside. From the company's standpoint, 1937 is important as being the 80th anniversary of the organization that carries the name of its founder, Gail Borden. From the industry's standpoint, it is important as being the 25th anniversary of commercial pasteurization of milk in New York City.

We are confident that every person visiting Borden's new Riverside plant will come away a greater friend and more thoroughly possessed of the picture involved in bringing to the doorstep not only wholesome milk but the protected product which has made Borden's famous. Therein will have been accomplished an important step for the entire industry in its public relations.

How Riverside Is Laid Out

By E. J. LOCKWOOD

General Engineer,
Borden Farm Products Division,
The Borden Co., New York, N.Y.

ABOUT TWO YEARS AGO, The Borden Company decided to consolidate some of its operations in the Borough of Manhattan, New York City, in order to improve operating economy. Mr. Bowman, of the real estate department, and the writer were commissioned to find a suitable location for a combined Grade A and Grade B plant, to supply Manhattan and part of the Bronx.

Enough space adjacent to the railroad, in a manufacturing or nonrestricted zone because of the necessary night operation, proved difficult to find. At last we hit upon the large building belonging to the Studebaker Corporation, on West 131st St., between Broadway and Riverside Drive.

This building, six stories high, was of reinforced concrete construction and was equipped with ramps reaching all floors. Floor areas were about 33,500 sq.ft. each, the building being 200x170 in area. It has entrances on West 131st St. and West 132d St.

Detailed study showed that this building could be made into an ideal city milk plant. The Borden Company purchased the building in October, 1936, and turned it over to the Engineering Department for development. Plans were then made to convert this former automobile sales and service building into a plant for pasteurizing and bottling milk. In the plans, provision was made for a plant to replace the Grade B pasteurizing plant on 128th St., the Grade A pasteurizing plant on 127th St., the retail distributing plant on 103d St., the retail distributing plant on 128th St., the wholesale distributing plant at 132d St., and the retail distributing branch on 133d St. Provision was also made to provide a part of the milk required at the 49th St. distribution branch, a large part of which had been coming from the Third Avenue, Brooklyn, plant; and also to provide a cream bottling operation to relieve the Long Island City branch, and to provide space for bottling milk in paper containers.

This combination is unusual in that the bottling of Grade A milk, Grade B milk, and cream are all carried out in the same plant. Milk is also filled into cans for special classes of customers.

To fulfill these requirements, the Grade B output at the start had to be about 140,000 qt. per day, and the Grade A about 73,000 qt. To this there had to be added capacity to handle some 15,000 qt. of bottled cream, and to take care of the various byproducts. The quantity to be filled into paper containers was indefinite, but the plant has been arranged to bottle, at the start 12,000 qt. per hour in quarts and about 4,000 qt. per hour in half-pints. To this capacity there was a possibility of adding part of the production from the existing 180th St. plant. The combined requirements called for a normal plant capacity up to 300,000 qt. per day of normal operation.

Most of this milk can be delivered directly from the new plant. This eliminates the former practice of trailer operation from the 127th and 128th St. bottling plants to the various distributing branches. As this trailer operation involved a costly transfer charge, the new plant permits considerable savings in trucking charges alone. To this can be added savings in labor cost incidental to the use of a large plant rather than several small plants; savings in power and refrigeration costs; and, most vital to The Borden Company, ability to deliver to the customer an improved and fresher product.

E. J. LOCKWOOD, general engineer, Borden's Farm Products Division, The Borden Company.

The new building is situated on a hillside, so that the entrance on 131st St. is to the first floor, while that on 132d St. is to the second floor. Decision was made to confine the raw milk receipt and the wholesale delivery operations to the first floor, the retail delivery operations to the second floor, which had two entrances from 132d St., the manufacturing operations largely to the third floor, and the greater part of the space on the fourth, fifth and sixth floors to storage space for automotive equipment. These floors have a capacity of about 150 route cars per floor. As this is in excess of the number of routes available for the plant, a portion of the sixth floor has been laid out in general offices.

Plans were ready for bids about Jan. 15, 1937, and in the first week in February the contract for general construction was let. This contract covered only the alterations to the building, and the successful bidder was A. Barbaresi & Sons, Mount Vernon, N.Y. Consulting architects on the building were W. H. & J. F. Dusenberry, New York. General construction was supervised by George Robinson, Equity Construction Co., New York, in cooperation with the Engineering Department of The Borden Company. For the company, A. E. Peterson was in direct charge of equipment installation. Neil A. Morrison, Assistant to General Engineer, was in charge of the specification, purchase and routing of all equipment used in the plant.

Drawings of the floor plans for the first five floors of the plant, shown herewith, indicate the arrangement of equipment and other facilities, and the path of flow which the milk takes through the plant.

Milk is received in trailer-mounted tanks and tank trucks. These enter the building on the West 131st St. side and are emptied by air pressure or pump into either the Grade A or the

Grade B weigh tank. From the weigh tank, the milk is transferred by air to the raw milk storage tanks after passing through a milk cooler. This storage tank equipment consists of fourteen glass lined steel tanks, each of 6,000 gal. capacity.

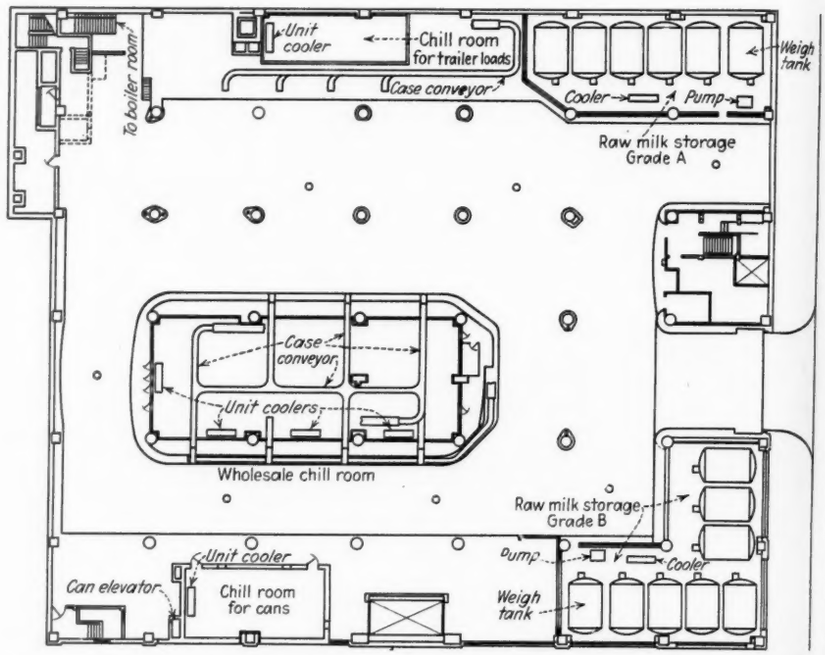
From the raw milk storage, milk is elevated to the third floor by air pressure to the suction end of raw milk pumps.

On this third floor there are two entirely separate departments for pasteurizing and filling milk; one for Grade A and one for Grade B. In effect this makes it two separate pasteurizing plants. The Grade A department has a capacity of 13,000 quarts per hour, while the Grade B department is of double that capacity. The equipment used in the two departments is of the same type.

The pumps deliver the cold, raw milk to heat exchangers of the plate type. There are three sets of the heat exchangers, two for Grade B, and one for Grade A, each consisting of two frames. The raw milk, as it enters, is warmed by hot milk leaving the holding tanks. During this warming process, the milk passes through filters. Final heating of this milk to pasteurizing temperature is accomplished by means of hot water in another section of the heat exchanger.

The milk, now at a temperature of 143 deg. F., passes from the heat exchangers through a surge tank and is drawn into the insulated holding tanks by means of vacuum. There are seventeen of these holding tanks, all of stainless steel.

After the 30-minute holding period, the pasteurized milk passes back by air pressure through the heat exchangers. It first gives up part of its heat to the entering raw milk, and then is cooled to filling temperature by refrigerated brine. From the heat exchangers, the pasteurized milk moves to the fillers direct or to feed tanks, which act as a storage for the bottle-filling machines, the paper container fillers, and the can-filling machine.



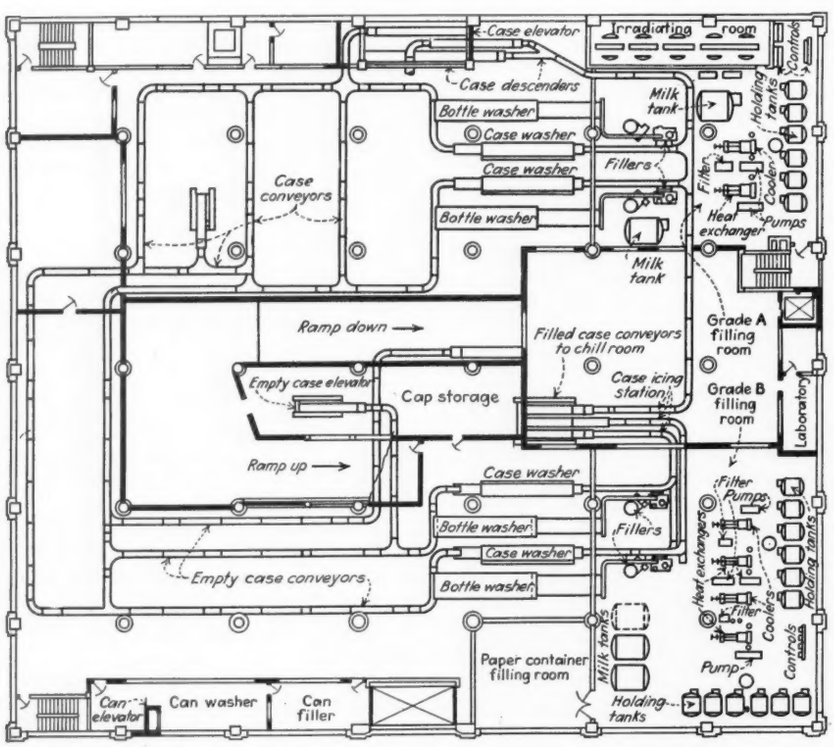
Plan of First Floor. Receipts of raw milk and wholesale distribution of pasteurized milk are accommodated on this level, which opens on West 131st Street.

Cases of bottled milk leave the filling stations on conveyors that lead first to the icing stations. Here each case gets a definite charge of flaked ice. The method of producing this ice, storing it, and feeding to the cases is described elsewhere in this issue.

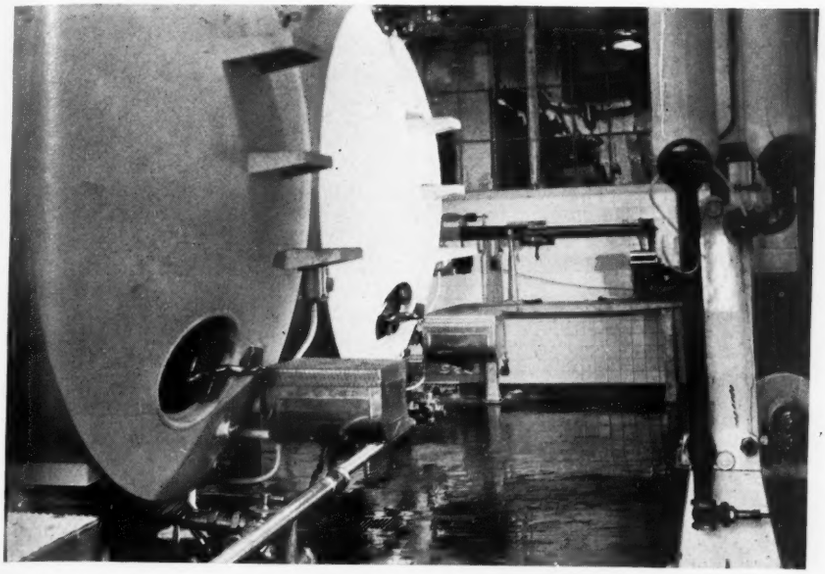
The iced cases of bottled milk continue on the conveyors to one or another of the chill rooms, where the milk is maintained at a temperature of 33 deg. F. until loaded into a vehicle for distribution.

There are five of these chill rooms in the plant: two on the second floor and three on the first floor.

Retail routes are served from the second floor chill rooms. Reference to the floor plans will show that the chill room on the east side of the building is somewhat smaller than that on the west. This smaller chill room serves the horse and wagon delivery units. Cases of milk are delivered through loading doors in the chill room wall by means of short reversible conveyors to the loading platform outside and are then placed in the wagons. These horse and wagon routes, which are housed at another location, enter on the West 132d St. side, where the second floor of the building is at street level, pass around the chill room, pick up their loads, and exit. In this way the horse equipment is in the building for the

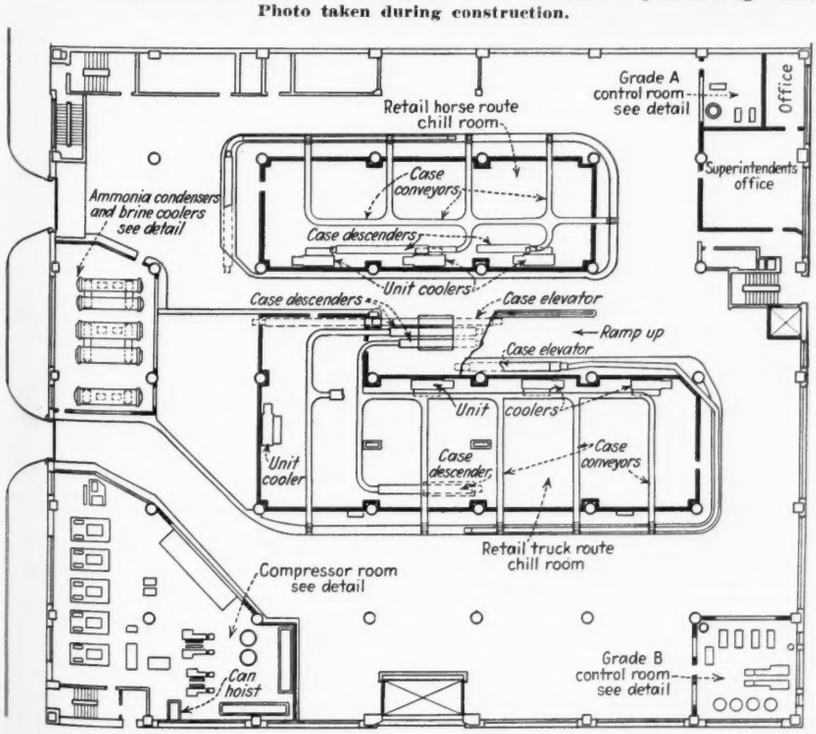


Plan of Third Floor. Pasteurizing, irradiating, bottling, and bottle, can and case washing are concentrated here.



In this Grade B raw milk storage room the weigh tank and scale are shown, with one of the storage tanks, the raw milk cooler and pump.

Heat exchangers, surge tank and holding tanks in the Grade B pasteurizing room. Photo taken during construction.



Second Floor Plan. Retail deliveries of pasteurized milk are made from this floor, through building entrances leading direct to West 132nd Street. Refrigeration, pumping, control and air handling equipment are also on this level.

shortest possible time. Also, the space in which both horses and motor trucks operate is partitioned off from the remainder of the plant, and has its own ventilating system, so that no odors or exhaust fumes can enter the manufacturing departments.

The larger of the two chill rooms on the second floor serves the retail motor truck routes. The trucks are stored on the fourth, fifth and sixth floors, which are reached by ramps from an entrance on West 132d St. to the second floor. In loading, the trucks come down the ramp from the vehicle storage, pick up their loads at the large retail chill room and then pass out on the West 132d St. side.

On the first floor are three additional chill rooms, a large one that serves the wholesale routes, and smaller ones for cans and for trailer loading. Wholesale route trucks enter on West 131st St., using the same entrance as the tank trucks which bring in the raw milk. These wholesale trucks drive around the wholesale chill room, pick up their loads, and leave again by the same entrance.

All of these chill rooms are held at the desired temperature by means of specially designed unit coolers.

Arrangements for bottle, can and case washing have been installed to dovetail efficiently with the operations just described.

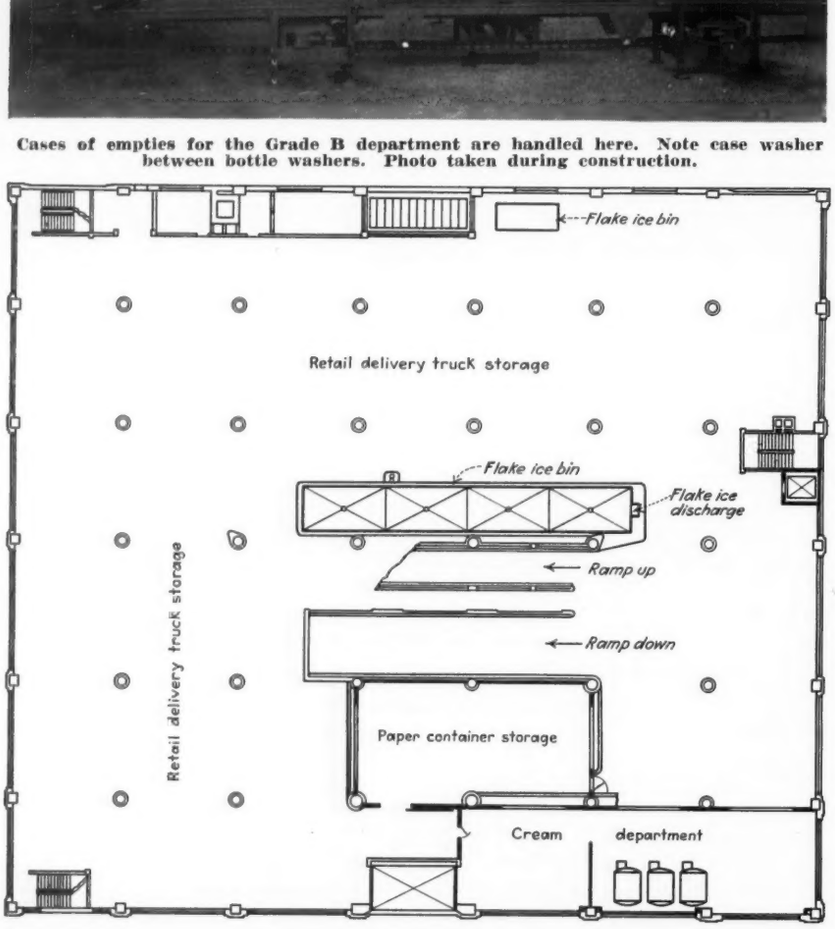
When a truck has completed its route, it returns to the plant through the same entrance by which it left. Cases of empties are unloaded on conveyors and elevated to the third floor.

On this third floor, at the north (or West 132d St.) side of the building, are located case, bottle and can storage spaces. Located between these storage spaces and the filling departments is the washing machinery, there being four bottle washers, each with a capacity of 120 bottles per minute, a can washer of eight cans per minute capacity, and two case washers, each of ten cases per minute capacity. As can be seen on the third floor plans, this washing equipment is arranged to feed the bottles, cases and cans by conveyors, in uninterrupted flow to the fillers.

Most important for economical operation of the plant are the carefully engineered facilities for supplying refrigeration, compressed air, hot water and steam. (See page *491.*) Refrigeration and compressed air are supplied from a machine room located in the northwest corner of the second floor. In this room are also located the

Filling equipment in the Grade B department during construction. This photo shows clearly the construction of the novel case conveyors used at Riverside.

Cases of empties for the Grade B department are handled here. Note case washer between bottle washers. Photo taken during construction.



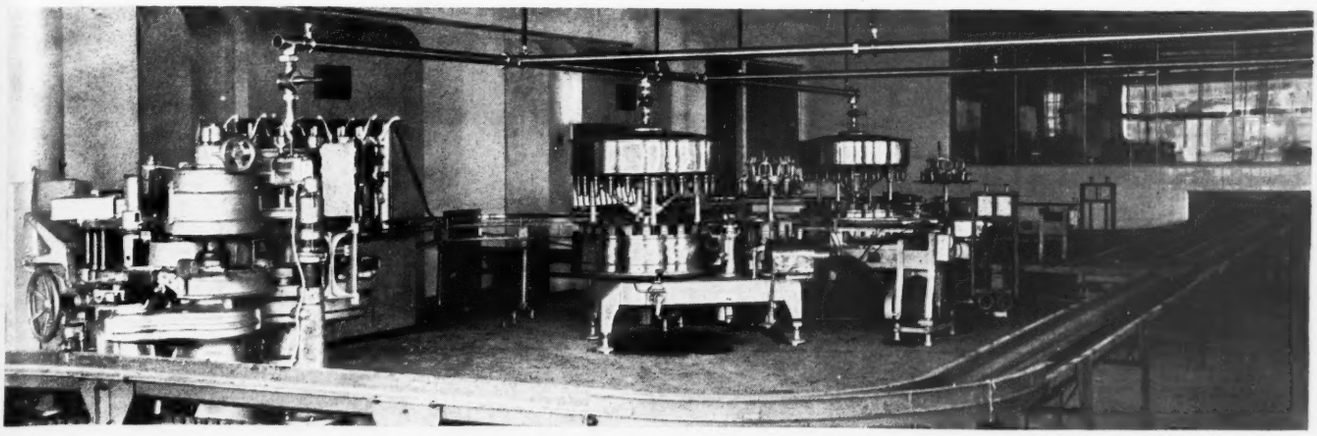
Fourth Floor Plan. On this level are the bins for storing flaked ice and the department for bottling cream, also storage space for about 150 delivery motor vehicles.

main switchboard, two motor-generator sets, scrubbers for cleaning oil from compressed air, and coolers for water and sterilizing solution.

Adjacent to the machine room on the second floor, but divided from it by the retail truck entrance, is an enclosure containing ammonia condensers and receivers, brine coolers and the pumping equipment used in the refrigeration system (see page *491*).

The boiler room is located in the basement, at the northeast corner of the building. There are two 125-hp. water tube boilers, supplying process steam; and two return tubular boilers for heating the building in winter. These boilers are oil fired, the oil supply being carried in tanks under the sidewalk adjacent to the boiler room. Other equipment in this room includes a condensate receiver, a feed water heater and feed pumps; also a vacuum pump for the heating system, a fire pump and a house-service water pump. The system for supplying hot water for milk heating, washing and other purposes is also in the boiler room. It consists of water heaters, a hot-water storage tank, and three hot-water circulating pumps.

On the second floor are two service pump or control rooms. One, the larger, located under the Grade B filling room, contains four scrubbers for compressed air in addition to those in the engine room. It also contains two vacuum pumps, two hot-water booster pumps, two brine booster pumps for supplying Grade B heat exchangers, and a pump and tank used in balancing the brine circulating system. A similar, but smaller pump or control room is located on the second floor beneath the Grade A filling room. This room has hot water and brine booster pumps, and a brine balance pump and tank.



Filling equipment in the Grade B department as seen from the side opposite to that shown on preceding page. Note paper bottle filler in foreground. Photo taken during construction.

By housing all temperature control valves, pumps and the like in these two control rooms, a very neat and clean pasteurizing department is obtained. Directly above each control room is located the instrument panel for the pasteurizing department involved, which brings the instruments and temperature elements in close proximity to the valves which they control.

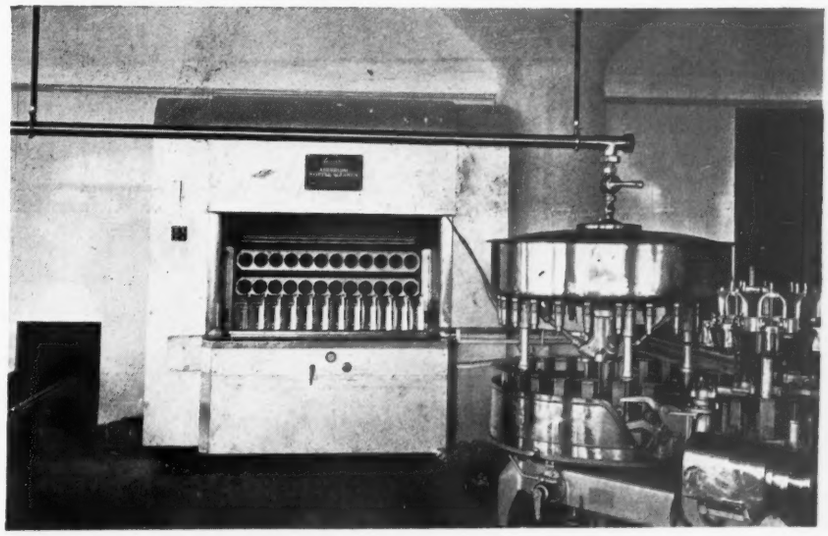
A feature of the third floor is a sealed, air-conditioned room containing three single and one double, arc-type irradiating units for the production of vitamin D milk.

Cases and cans are moved throughout the plant on a complete conveyor system of novel design.

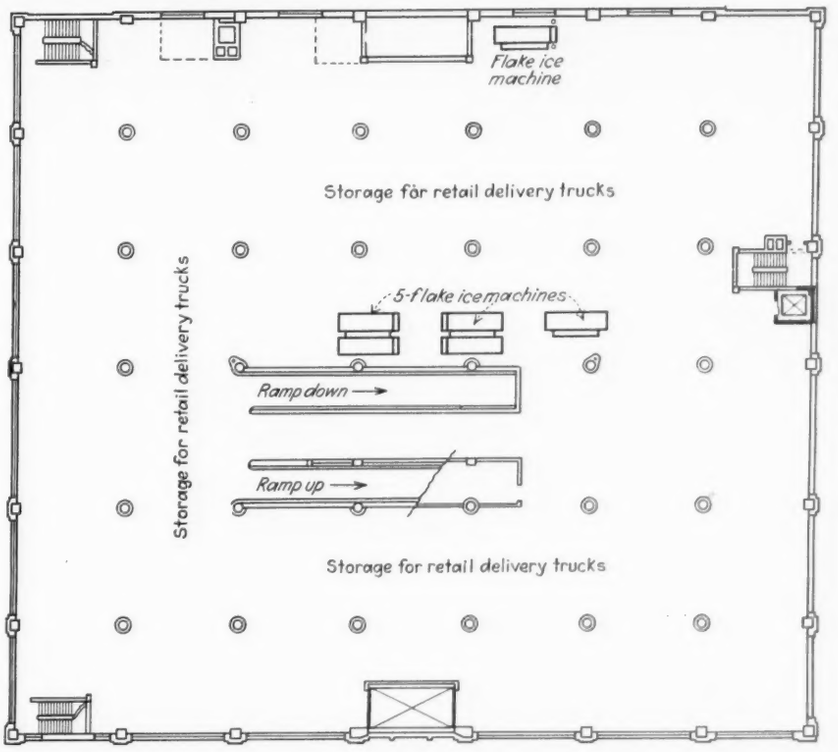
All handling of milk would be by compressed air except for the fact that a considerable amount of the older Borden tank-truck or tank-trailer equipment is too light to withstand high air pressures. Though all the new automotive equipment is of heavy design for the use of compressed air unloading, there are too many of the lighter tanks to discard. Hence the need of a dual method of handling raw milk by both pumps or compressed air. The compressed air method is used to handle all milk beyond the weigh tanks, except where vacuum is used to draw hot milk into the pasteurizer holding tanks. How air is cleaned is described on page *495*.

Numerous special features of this plant, including some that are definitely forward steps in milk plant design, the engineering of the steam, water, and refrigeration supply, and the methods of handling distribution from this plant, are described in detail in the three following articles.

Appended is a complete list of the equipment which is installed at the Riverside plant.



Discharge of high speed bottle washer in Grade B filling department.



Fifth Floor Plan. This floor is devoted to delivery motor vehicle storage, except for the six machines that produce ice for icing cases of filled bottles.

Equipment in Borden Riverside Plant

Storage tanks (6,000-gal) (14), Pfaudler Co., Rochester, N. Y.
Prefiller tanks and pasteurizing holders (21), Pfaudler Co., Rochester, N. Y.
Bottle fillers (4), Cherry-Burrell Co., Chicago, Ill.
Can washers (2) and case washers (3), Rice & Adams Corp., Buffalo, N. Y.
Irradiating equipment (10), National Carbon Co., Cleveland, O., E. A. Kaestner Co., Baltimore, Md.
Milk tank scales (2), Howe Scale Co., Rutland, Vt.
Milk filters (3) made in England by Aluminum Pressure Vessel Co. and sold by J. S. Biesecker Co., New York.
Bottle washers (4), Michael Yundt Co., Waukesha, Wis.
Cooper-Hewitt bottle inspection lights, Burkon-Frink Tube Lighting Corp., Long Island City, N. Y.
Raw-milk coolers (2), York Ice Machinery Corp., York, Pa.
Heater-cooler regenerators for pasteurizers (3), York Ice Machinery Corp., York, Pa.
Water coolers for bottle cooling (2), Frick Co., Waynesboro, Pa.
Water heaters (3), Griscom-Russell Co., New York, N. Y.
Hot-water storage tank, Patterson-Kelley Co., E. Stroudsburg, Pa.
Air filters for air conditioning system, Coppus Engineering Corp., Worcester, Mass., Eugene C. Cantin
Case and bottle conveyor systems, Walter Maguire Co., Inc., New York, N. Y.
Steel work for conveyor systems, Fassler Iron Works, Inc.
Push trucks (cans), Cherry-Burrell Corp., Chicago, Ill.
Brine and water pumps, Pennsylvania Pump & Compressor Co., Allentown, Pa.
Cold milk pumps, Bump Pump Co., La Crosse, Wis., Waukesha Foundry Co., Waukesha, Wis.
Hot milk pumps, Cherry-Burrell Corp., Chicago, Ill.
Delivery trucks, White Motor Co., Cleveland, Ohio, Divco-Detroit Corp., Detroit, Mich.
Sanitary pipe wash racks, Victor Iron Works, Inc., Wisner Manufacturing Co., New York, N. Y.
Sanitary piping, Cherry-Burrell Corp., Chicago, Ill., Babcock-Wilcox Co., New York, N. Y.
Sanitary valves and fittings, Cherry-Burrell Corp., Chicago, Ill.
Special white paint for milk tanks and other equipment, E. I. du Pont de Nemours & Co., Wilmington, Del.
Aluminum paint, Pate Bros., Inc., Milwaukee, Wis.
Unit heaters and coolers, air circulating system, Niagara Blower Co., Buffalo, N. Y.
Ammonia compressors (7), York Ice Machinery Corp., York, Pa.
Ammonia purger, Hill Manufacturing Co., Chicago, Ill.
Cork insulation, Cork Insulation Co., New York, N. Y., United Cork Cos., Kearny, N. J., Cork Import Co., New York, N. Y.
Cold storage doors, Jamieson Cold Storage Door Co., Hagerstown, Md.
Air cooling units for milk chill rooms (12), Vilter Manufacturing Co., Milwaukee, Wis.
Flakice machines (10-ton) (6), Flakice Corp., Newark, N. J., made by York Ice Machinery Corp., York, Pa.
Controls on can washers, Taylor Instrument Co., Rochester, N. Y.
Regulators on brine lines, Mason-Neilan Regulator Co., Boston, Mass.
Regulators, washers, Power Regulator Co., Chicago, Ill.
Temperature controllers for milk, Taylor Instrument Co., Rochester, N. Y.
Indicating thermometers, Moeller Instrument Co., Richmond Hill, N. Y.
Pressure gages, Consolidated-Ashcroft-Hancock Co., Bridgeport, Conn., Jas. P. Marsh Co., Chicago, Ill.
Air-pressure reducing valves, Mason-Neilan Regulator Co., Boston, Mass.
Brine relief valves, Ashton Valve Co., Cambridge, Mass.
Unit heaters, Modine Manufacturing Co., Racine, Wis.
Valves, Lunkenheimer Co., Cincinnati, Ohio
Pipe and fittings, Crane Co., Chicago, Ill.
Unit ventilators, Niagara Blower Co., New York, N. Y.
Fans, Clarage Fan Co., Kalamazoo, Mich.
Brick tile floors, Hanley Co., Bradford, Pa.
Floor tiles, Carlyle Tile Co., Ironton, Ohio
Waterproofing (Torcrete), A. Barbaresi & Sons, Mt. Vernon, N. Y.
White wall tile, Franklin Tile Co., Lansdale, Pa.
Wall finish, Atlantic Gypsum Products Co., Buffalo, N. Y.
Paint (wall), Pratt & Lambert, Inc., Long Island City.
Uniflow engine for ammonia compressor, Skinner Engine Co., Erie, Pa.
Vacuum pumps, (2), Chicago Pneumatic Tool Co., New York, N. Y.
Low pressure air compressors (2), Chicago Pneumatic Tool Co., New York, N. Y.
High pressure air compressors (2), Ingersoll Rand Co., Phillipsburg, N. J.
Air filters for all air lines, pasteurizer and compressors, Staynew Filter Co., Rochester, N. Y.
Oil separators for compressed air lines, Blaw-Knox Co., Blawnox, Pa.
Hold-up alarm system, Auth Electrical Specialty Co., New York, N. Y.
Dairy hose, Home Rubber Co., Trenton, N. J., U. S. Rubber Co., New York, N. Y.
Synchronous motors and starters (4), Electric Machinery and Manufacturing Co., Minneapolis, Minn.
Induction motors, Electric Machinery and Manufacturing Co., Minneapolis, Minn., Century Electric Co., St. Louis, Mo.
Power switchboard, Sundh Electric Co., New York, N. Y.
Auto motor starters on compressor motors, Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa.
Motor-generator sets, Electric Machinery and Manufacturing Co., Minneapolis, Minn.
Control board for motor-generators, Electric Machinery and Manufacturing Co., Minneapolis, Minn.
Motors on bottle washers, Louis Allis Co., Milwaukee.
Motor starters, Allen-Bradley Co., Milwaukee, Wis., Cutler-Hammer Co., Milwaukee, Wis.
Fire extinguishers, General Fire Truck Co., Detroit.
Roofing (under spray pond), Johns-Manville Corp., New York, N. Y.
Electrical lighting fixtures, Benjamin Electric Manufacturing Co., Chicago, Ill.
Conduit and fittings, National Metal Molding Co.
Power panels, outlets and switches, Russell & Stoll Co., New York, N. Y.
Receptacles, Hart and Hegeman Electric Co., New York.
Lighting-switchboards, Empire Switchboard Co., Inc., Brooklyn, N. Y.
Wire, Triangle Wire and Cable Co., New York, N. Y.
Wrought iron pipe, A. M. Byers Co., Pittsburgh, Pa.
Pipe and equipment insulation, Philip Carey Co., Cincinnati, Ohio
Boilers, Erie City Iron Works, Erie City, Pa.
Exhaust heads, Swarthout Co., Cleveland, Ohio
Hi Pressure Jennys (2), Homestead Valve and Manufacturing Co., Coraopolis, Pa.
Check valves, Jenkins Valve Co., New York, N. Y.
Plug valves, Walworth Co., Bridgeport, Conn.
Lubricating system on bottle washers, Farval Corp., Cleveland, Ohio
Oil burners, Enterprise Oil Burner Co., San Francisco.
V-Belt drives, Manhattan Rubber Co., New York, N. Y.

Engineering and Structural INNOVATIONS *at Riverside*

By NEIL A. MORRISON
and
A. E. PETERSON,
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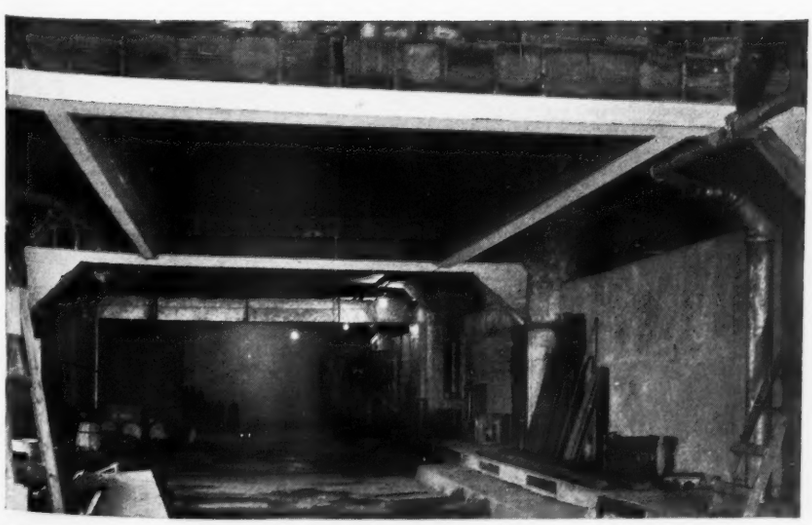
NOVEL FEATURES have been introduced into the Riverside Plant for two reasons. First, in adapting an existing building, built for another purpose, to the processing and distribution of market milk, certain structural adjustments had to be made. Also, the engineering of the plant, with relation to the choice of equipment and its position in the plant, had to be worked out so as to give the highest economy and convenience possible under the sanitary requirements that must be observed in all plants handling market milk.

Solutions to the many problems of this nature that were encountered were worked out by E. J. Lockwood, general engineer, and the engineering staff under his direction. Some of the most important of these innovations are discussed briefly in the following paragraphs.

Laying water-proof floors on second floor of Riverside plant. Also shown are Grade B control room and part of ramp ventilating system.

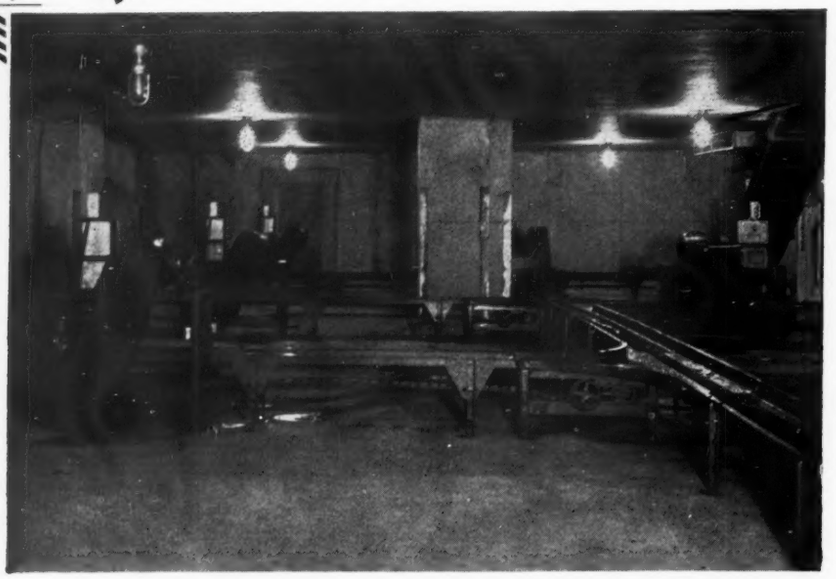


Reinforcing of floor under one of the bottle washers, shown after beams had been covered with tile, but before plastering and painting had been completed.

Waterproofing Floors. On the operating floors (the third floor and other operating spaces—see floor plans) it was necessary to substitute a waterproof and sanitary floor finish for the existing concrete surface. Because the plant floors were built to withstand a load of only 125 lb. per sq.ft., and because the equipment installed is heavy, it was not permissible to place a membrane waterproofing and a sanitary finish on top of the existing floors, because of the greatly added weight. This difficulty was overcome by "scarifying," a mechanical process. The surface of the old floor was removed by chipping and scraping, leaving a new, rough surface. After cleaning with water at 400 lb. per sq.in. pressure, a new waterproof cement finish was applied to this surface. In the pasteurizing rooms, where the equipment is not heavy, the old floor was waterproofed with a three-ply tar and felt membrane and a finished floor of red, sanitary tile.

Reinforcing for Special Loads. Because of the light load-bearing capacity of the plant floors, special provision had to be made to support the heavy load of the bottle washers. It was not possible to carry this load on a new structure, as that would have required putting columns down from the third floor to the ground, which would have interfered with operating space on the second and first floors.

The solution was found by installing



Interior construction of milk chill room, with case conveyors under erection. Note marine-type lamps used in illumination.

This spray pond on roof permits economy in the use of water for ammonia condensing and air conditioning.

the supporting structure shown in the photograph. In this, structural steel beams extend between columns and under the washers to reinforce the third story floor panels. These beams are carried on columns of structural steel, each one story in height. The loading of these columns is carried by the heavy reinforced concrete caps at the top of the first floor columns. The whole structure of steel is covered with vitrified building tile and plaster to give a smooth finish that can be kept clean and painted.

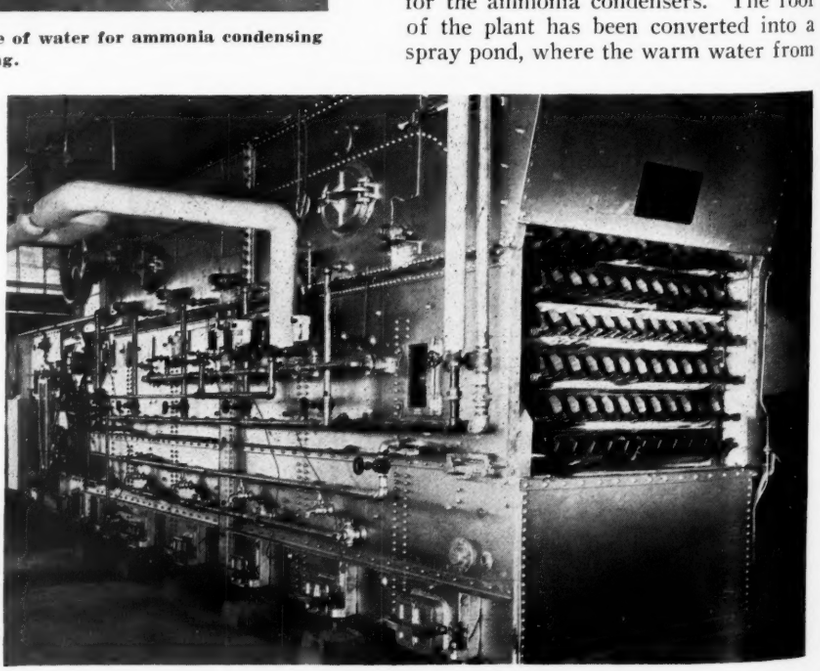
Removing Ramp Between First and Second Floors. In utilizing this former garage building as a milk plant, it was decided to make a definite separation between retail and wholesale routes. As the plant has entrances on two levels, on West 131st Street for the first floor, and on West 132d St. for the second floor, it was decided to handle all retail distribution from the second floor, and all wholesale distribution from the first floor. To complete the separation, the existing ramp from the first to the second floor was removed and the opening closed.

To do this it was necessary to build a steel framework in the opening left after the ramp was removed. This frame was supported by light steel columns carried to the top of the existing column footings, which were sufficient for the added load. A new reinforced concrete floor was then poured in this framework.

Construction of Chill Rooms. Retail and wholesale routes are served from chill rooms where the milk is maintained at low temperature between bottling and loading of the trucks. There are five of these chill rooms: two large rooms on the second floor and one large and two small rooms on the first floor.

Construction of these rooms has been carried out in an unusual manner. Instead of building them with insulated masonry walls, they are constructed with metal frames and T-bar studs. Walls are made of cork board, 4 in. thick. Under the cement floor there is also 4 in. of cork insulation. The floor is doubly waterproofed by laying the cork on waterproofing and then placing a second waterproofing on top of the cork. The roof is of planking, with a 2-in. thickness of cork. Walls are finished with cement plaster and the ceilings with asphalt-mastic, and both walls and ceilings are painted.

Spray Pond. An unusual means has been employed to provide cool water for the ammonia condensers. The roof of the plant has been converted into a spray pond, where the warm water from



Control side of high speed bottle washer, photographed while controls were being installed.

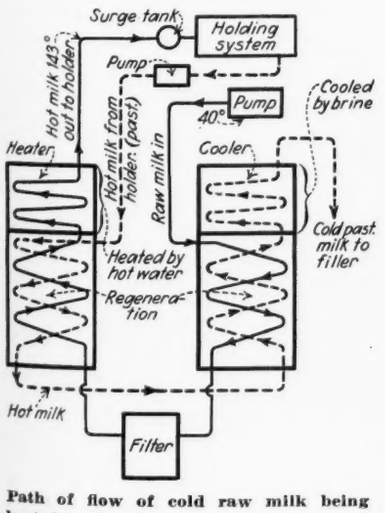
the condensers is forced out into the air as spray through a large number of nozzles. As it falls to the surface of the pond, the water is cooled by evaporation. Cool water is drawn off from the pond to repeat the circuit through the ammonia condensers and back to the nozzles.

The location of this pond on the roof provides an economical and convenient method of providing cool condenser water. It also serves to keep the roof cool and, in turn, cools the plant offices which are on the top or sixth floor. The importance of this pond to refrigeration economy in the plant is discussed in the article that commences on page *491*.

Bottle Washer Drainage. One innovation is the method adopted to take drainage from the bottle washers. Instead of this water being discharged onto the floor, a drainage system has been installed in the washers themselves. This assembles all the drainage from each washer in one concentrated stream, flowing into the drainage system in sufficient volume to assure cleanliness of the washer drains.

Heat Regeneration in Bottle Washers. A decided novelty is found in the application of regenerative heat economy to the operations of presoaking and washing in the bottle washers which is described in the article commencing on page *491*.

Refrigerated Bottle Cooling. The bottle washers have been designed to provide cooled, circulated water for cooling the sterilized bottles to a temperature of 36 deg. F. This makes possible colder bottles to receive the cold milk and prevents temperature increases in the bottles immediately after filling. It results in an improved product, a saving of ice and a further saving of refrigeration in the chill room.



Path of flow of cold raw milk being heated, and hot pasteurized milk being cooled, in one of the two frame plate heat exchangers.

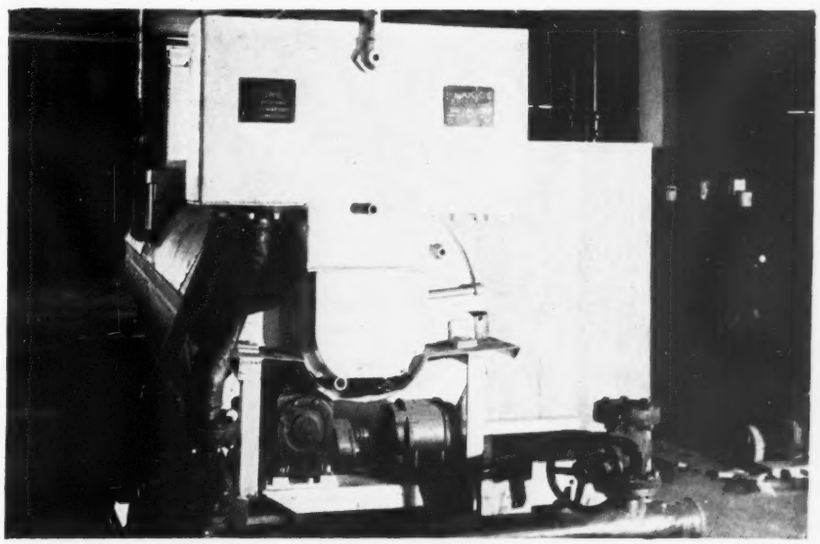
Chute for Broken Glass. In order to keep broken glass off the floor around the bottle washers, a chute has been built in at each washer. All broken glass is put in this chute, which conveys it to a separate storage bin on the ceiling below where it can be automatically unloaded into containers for disposal.

Heat Exchangers and Coolers for Milk. Milk is brought up to pasteurizing temperature and also cooled after pasteurizing by a novel arrangement of two-frame, plate heat exchangers. These operate on a cycle which is approximately 75 per cent regenerative, one frame serving as a heater and regenerator, the other as a cooler and regenerator.

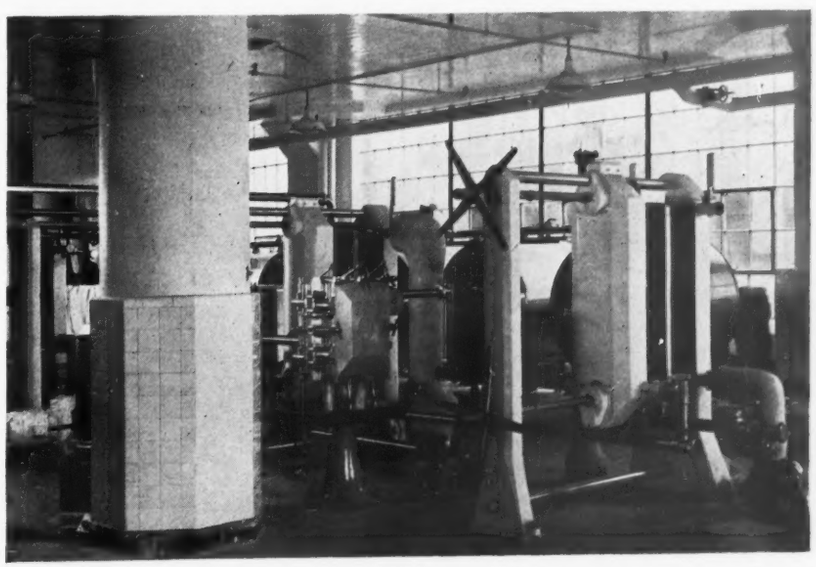
In the accompanying diagram, the flow of milk in the heat exchangers is shown. As the cold, raw milk enters the exchangers, it is heated by hot milk which has just left the holding tanks. This regenerative heating occurs in part of each frame. In the remainder of the heating frame, the raw milk is brought up to pasteurizing temperature by means of hot water.

Hot milk from the holding tanks gives up part of its heat to the entering raw milk, as already described. The remainder of the heat is removed by means of brine in the cooling frame of the heat exchanger.

Milk Filters. A novel filter is used for filtering the milk before bottling. It is of English make (Aluminum Pressure Vessel Co.). This filter is set be-



Operating end of machine for producing flaked ice, photographed before piping and insulation had been completed.



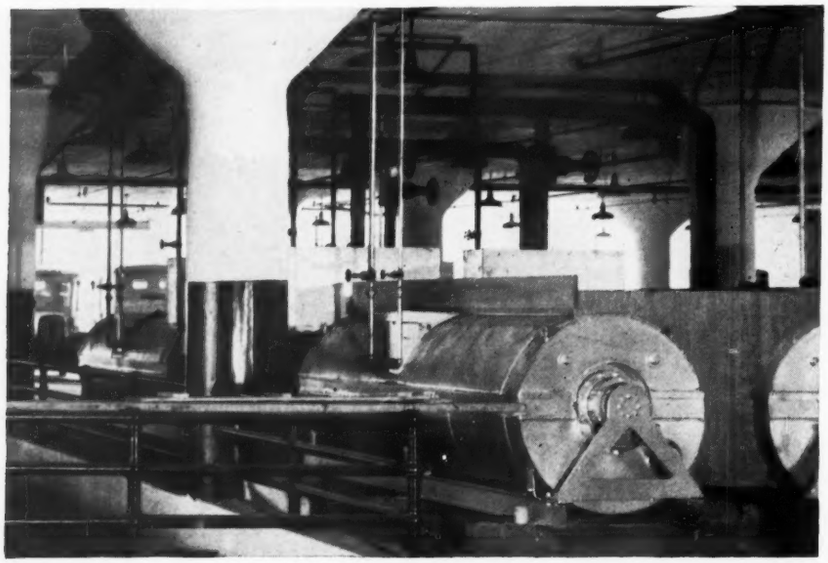
Grade B milk heat exchangers being installed at Riverside, with one of the novel aluminum milk filters shown at center.

tween the two frames of the heat exchanger (see diagram) and is so connected that partially heated raw milk passes through it before the heating is completed in the second, or heating, frame.

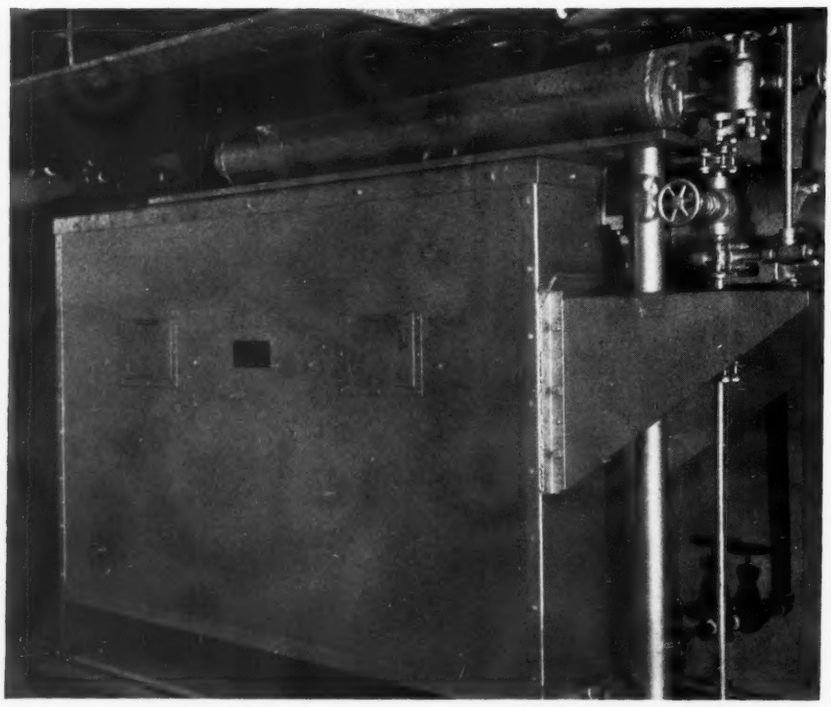
Ice Supply for Milk Cases. A new system of supplying flaked ice for packing in cases of filled milk bottles has been developed for the Riverside plant.

Six ice machines are used, each with a capacity of 10 tons of ice per 24 hour day. The machines are located on the fifth floor. As the flaked ice is produced, it is discharged through slots in the floor to insulated storage bins on the fourth floor.

From these bins the ice is fed by conveyor to automatic icing machines on the ceiling of the third floor. These ice machines are spotted directly above the conveyors which take the cases of filled bottles from the filling machines to the chill rooms on the second and first floors. As the cases pass below the icing machines, "electric eye" controls cause a predetermined charge of the ice flakes to be automatically deposited in each case.



Insulation under construction at battery of five flaked ice producing machines.



Special type of unit cooler designed for use in the milk chill rooms at Riverside.

Cooling of Chill Rooms. Specially designed unit coolers are employed to keep the chill rooms at a temperature of 33 deg. F.

These units are of the forced draft type. They have flooded ammonia coils with integral float controls. These units are also provided with outside air defrosting recirculation connections to remove any accumulation of frost from the cooling surface. There are twelve of these units in the various chill boxes. Each has a capacity of about 9 tons of refrigeration.

Conveying System for Cases and Bottles. A new type of conveyor is used throughout the Riverside Plant for handling all cases and bottles. These conveyors make use of a chain under the load as a positive means of moving the load on horizontal runs, and of two chains and push bars in elevators and descenders. While this is common practice, the new conveyors substitute a pressed sheet steel frame for the usual frame built of angles and channels. The result is a gain in simplicity and flexibility. There is also a saving in power use. Loads move on these conveyors more smoothly, while jams and spills are avoided. More than two miles of chain are employed in the Riverside conveying system. The plant has standardized on stock chains, so that replacement of worn chains is easy.

The conveyors are arranged with selective electrical control to permit operation at the will of the operators. Conveyors in the chill rooms and case storage rooms are reversible. The descenders and elevators have remote control stations at each floor, permitting complete control of the system at various stations. All electrical control is of the water-proof type.

Ventilation of Ramps and Loading Spaces. With hundreds of horse-drawn vehicles and delivery trucks entering and leaving the building, special provision had to be made to ventilate the space where they operate.

All loading platforms are equipped with ventilating outlets beneath the platform edge. Exhaust fans suck out the air from the loading spaces and expel it through a concealed duct system built under the loading platform.

The ramps where the trucks operate between the garage spaces on the upper floors and the loading platforms at the chill rooms are enclosed from top to bottom. Ventilating ducts are enclosed in the ramp walls with frequent outlets. The exhaust fan system can thus remove air from the ramps into the ventilating ducts at a sufficient number of points to keep the air in the ramps fresh and safe to breathe.

Engineering That Has Made GREAT ECONOMIES

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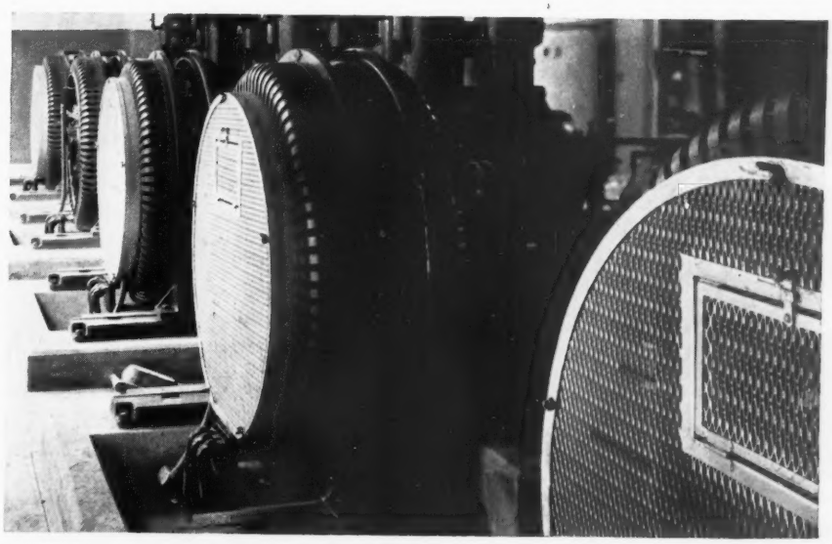
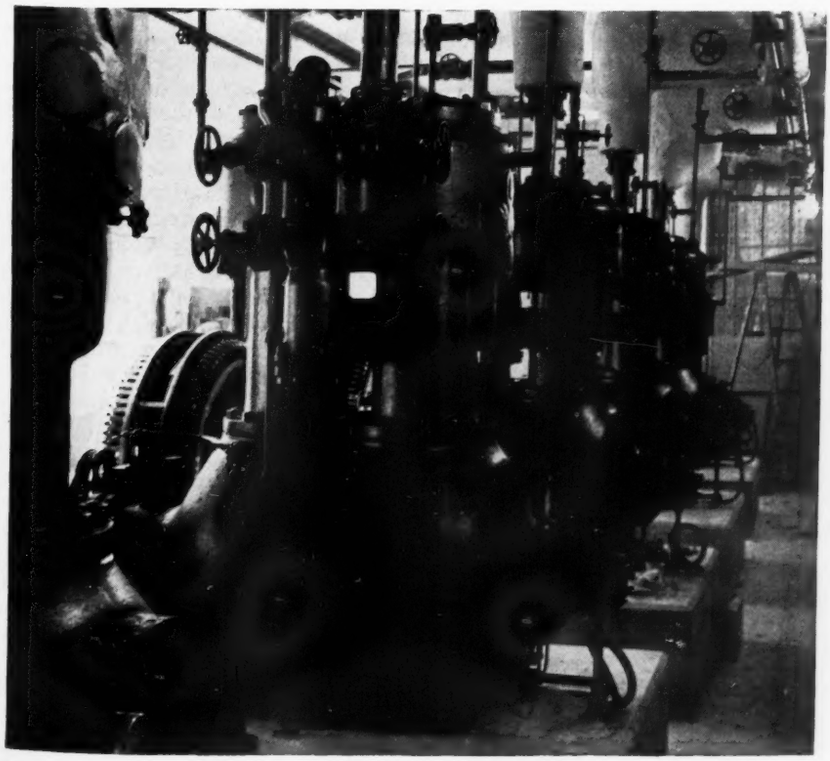


These five 125-hp. synchronous motors, driving ammonia compressors, serve to correct the power factor for Riverside, so that electric current is used with economy.

NOT ONLY has the design of the Riverside plant reduced labor costs to a minimum but also other economies in the use of heat, refrigeration, electricity and water have been included.

The engineering design of this plant embodied certain basic principles: (1) Economy in the use of steam by virtue of the fact that exhaust steam from an engine still retains about 90 per cent of the B.t.u. that were present when it passed through the throttle, which are available for process heating, (2) low water consumption by the use of a spray pond for cooling the ammonia condenser water—necessitated by the high cost of city water and the lack of well water at this location, (3) the maximum amount of work accomplished by purchased electric power with a low demand and high power factor through the proper combination of types and sizes of electric motors to make available a flexible arrangement of operation at various loads.



Some of the ammonia compressors used to supply 475 tons of refrigeration at Riverside.

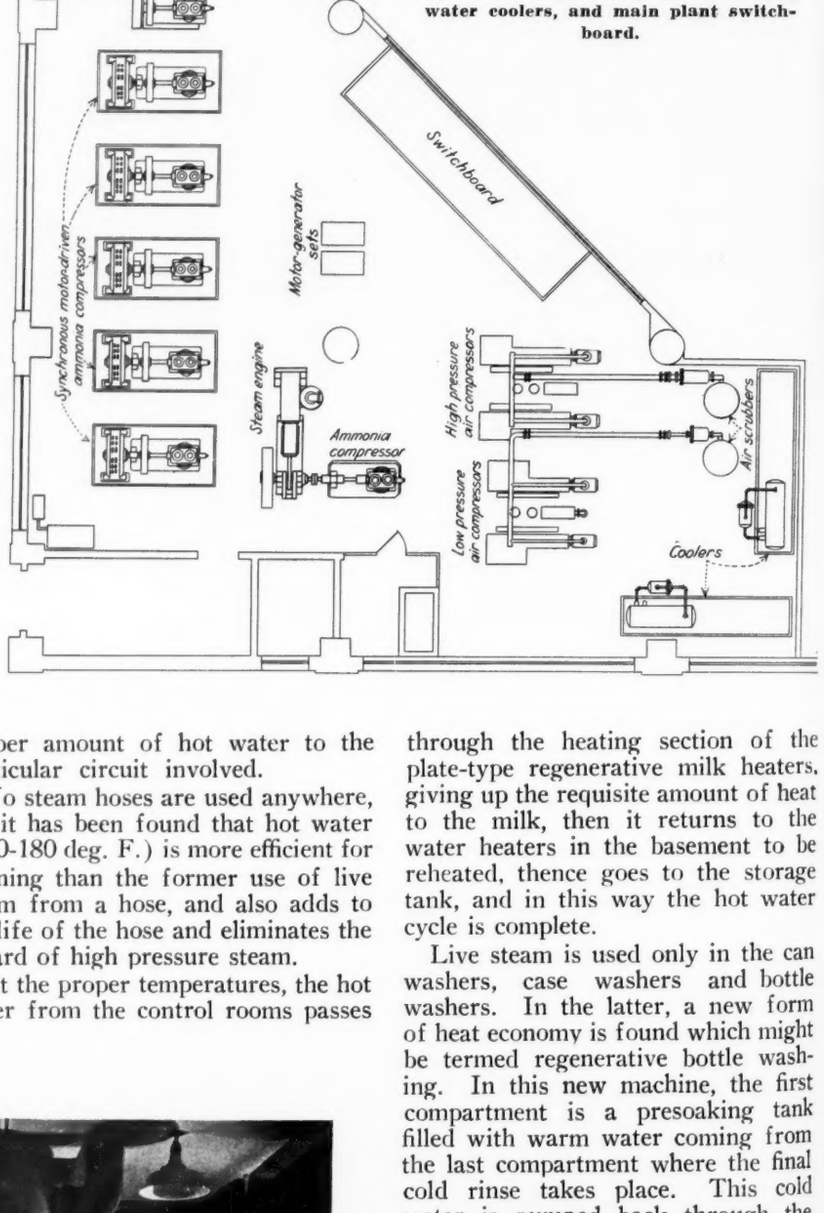
To put these and other economies into effect has required an extended study and calculation of the heat balance, power demand, refrigeration load, and water requirements, resulting in the installation of equipment of correct size and the plan of operation to be described subsequently.

Process Heating. With the highly unbalanced heat and power load

which characterizes a milk pasteurizing and bottling plant, the generation of all the power used would result in a surplus of process steam from the exhaust, 90 per cent of which would be wasted. Hence the plan is to generate only enough power from steam to supply an amount of exhaust steam that will meet all normal processing requirements. The rest of the power is purchased as electricity.

The total power load is 1,200 hp., yet the amount of process steam needed for heating hot water is only the amount exhausted by a 115 hp. uniflow engine at 5 lb. back pressure. This calls for a boiler capacity sufficient to supply this amount plus the live steam needed for the bottle washers, can washers, and case washers. Accordingly, two 125-hp. (normal rating) oil fired, water tube boilers operating at 150 lb. pressure have been installed in the basement.

All of the steam, except that which goes to the bottle washers and can washers, goes through the uniflow engine which drives one of the ammonia compressors. Exhaust steam from the engine, at 5 lb. pressure, passes through three closed type water heaters, the condensate being returned to the boilers. Hot water is stored at 180 to 200 deg. F. in a 4,000-gal. insulated water tank which supplies all the process heat throughout the building, as well as hot water for cleaning operations. Pressure on the hot water system is maintained by a centrifugal pump. At each outlet, usually in the control rooms below the pasteurizers, an automatically controlled mixing valve maintains the desired temperature by admitting the proper amount of hot water to the particular circuit involved.



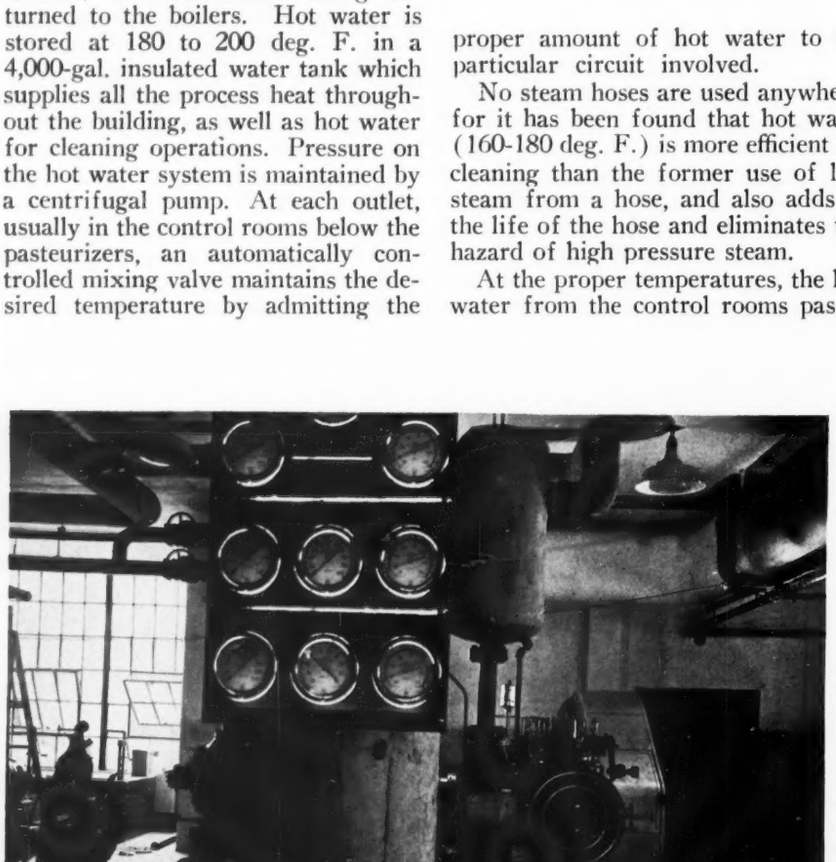
Plan of compressor room, showing location of seven ammonia compressors, four air compressors, air scrubbers, water coolers, and main plant switchboard.

No steam hoses are used anywhere, for it has been found that hot water (160-180 deg. F.) is more efficient for cleaning than the former use of live steam from a hose, and also adds to the life of the hose and eliminates the hazard of high pressure steam.

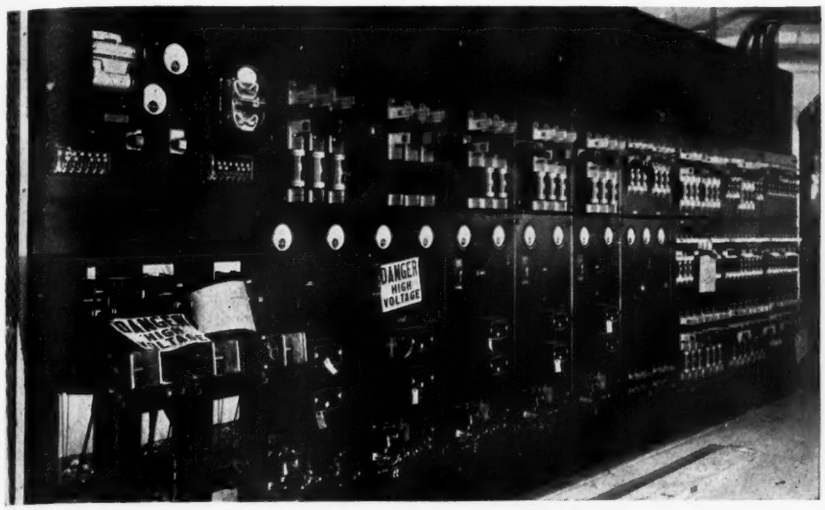
At the proper temperatures, the hot water from the control rooms passes through the heating section of the plate-type regenerative milk heaters, giving up the requisite amount of heat to the milk, then it returns to the water heaters in the basement to be reheated, thence goes to the storage tank, and in this way the hot water cycle is complete.

Live steam is used only in the can washers, case washers and bottle washers. In the latter, a new form of heat economy is found which might be termed regenerative bottle washing. In this new machine, the first compartment is a presoaking tank filled with warm water coming from the last compartment where the final cold rinse takes place. This cold water is pumped back through the soaker cooler-coils in the last two soaker compartments, cooling these tanks to the required temperature. A branch from this line also supplies tempered water to the outside bottle brushes.

The water, considerably warmed, then continues to the pre-rinse compartment of the soaker where the dirty bottles are fed into the washer, bathes them under pressure and removes the debris. This water is now wasted in the overflow section of the pre-rinse compartment. By this method there results a very considerable saving of B.t.u. both in heating and cooling the bottles.



Control board in compressor room and uniflow engine which operates one ammonia compressor, photographed just before construction was completed.



Main switchboard at Riverside.

Water Consumption. Since the location of this plant is such that the only water supply is New York City water, it was important to discover every place where water could be saved and where re-use would be permissible. The largest users of water are the ammonia condensers, and with the plant's 475-ton refrigeration load the required cooling water amounts to 2,000 gal. per min. This, of course, becomes warm water which must be cooled before it can be used again. Cooling is accomplished by evaporation in a 15,000-sq.ft. spray pond on the roof. This pond is also designed to cool the water used in the future air-conditioning equipment serving the manufacturing department and the plant offices on the sixth floor.

Makeup water to replace evaporation losses is drawn from the city supply through a small reserve tank equipped with a float valve to keep a constant level in the pond. Any overflow goes down the rain spouts.

Power Factor, 95 Per Cent; Load Factor, 70 Per Cent. Total electrical load throughout the plant is about 1,200 hp., divided between 625 hp. driving the synchronous motors on five ammonia compressors and 575 hp. of large and small induction motors. The leading power factor of the synchronous motors corrects the lagging power factor of the induction motors to the extent of an anticipated power factor of 0.95.

The plant is designed for a load factor of about 70 per cent during the summer months, which represents an efficient use of purchased power comparable to the very high power factor. The 70-per cent load factor is attained by controlling the number of ammonia compressors in operation in accordance with the fluctuations in the plant load. In this manner the power demand is kept below the maximum demand beyond which the company would incur penalty charges.

How Refrigeration Is Used. Three principal uses of refrigeration exist in this plant: (1) cooling incoming raw milk and hot milk after pasteurization, (2) keeping the chill boxes at 33 deg. F, (3) making ice.

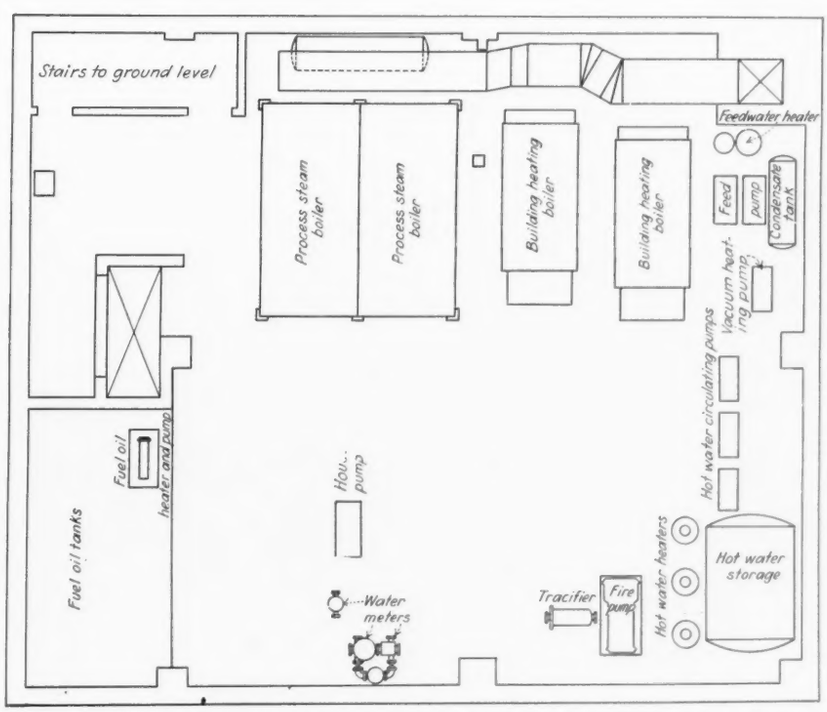
To get the highest efficiency from the refrigerating system has required an unusual amount of planning and calculation. The combined refrigerating load is approximately 475 tons, all of which is transmitted by three separate but interconnected brine systems. In emergencies the brine from any one system can be diverted to the other systems.

Milk-cooling brine is kept at 25 deg. F., while ice making brine is held at a theoretical 10 deg. F.

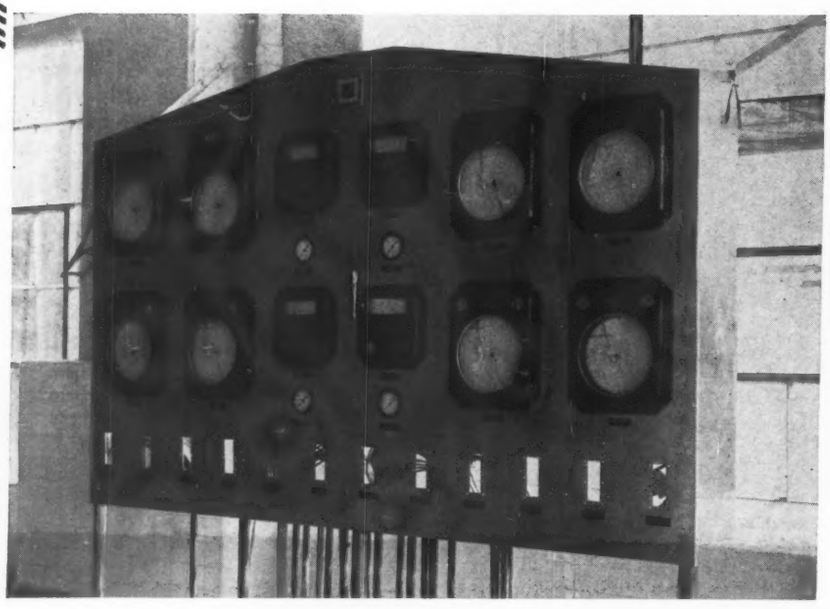
Equipment for this refrigeration service comprises:

- Five 10x10-in. ammonia compressors direct connected to 125 hp. synchronous motors.
- One 8x8-in. ammonia compressor belted to a 60 hp. induction motor.
- One 10x10-in. ammonia compressor direct connected to a 115 hp. uniflow steam engine.
- Two zig-zag instant water coolers with water capacity of approximately 100 tons.
- Two shell and tube ammonia condensers and one liquid receiver.
- Three shell and tube ammonia, float-controlled, brine coolers.

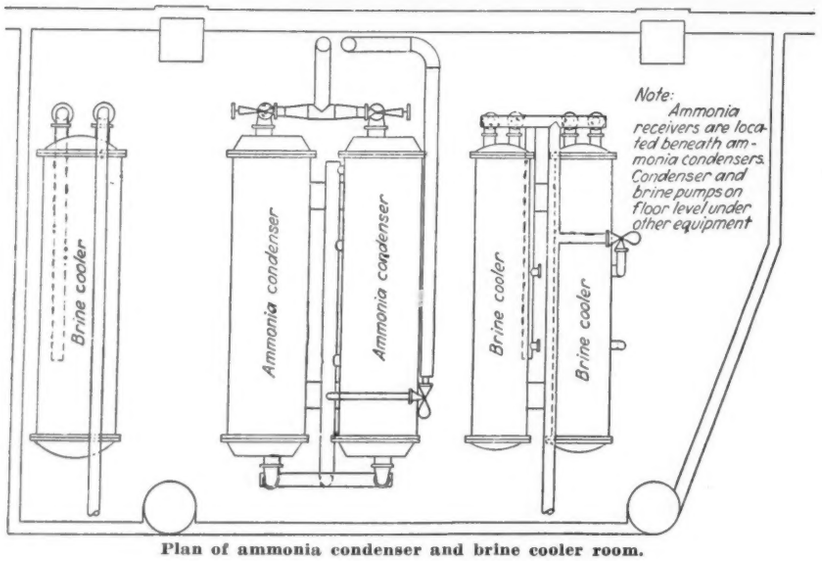
Flake ice is made at the rate of 60 tons per 24 hours, under full operation with 10 deg. brine. But, in order to maintain a minimum electrical load demand, most of the ice is to be made during the sixteen-hour period while bottling operations are stopped. During the eight-hour working period of bottling and pasteurizing the milk very little ice will be made.



Plan of boiler room, showing location of water heaters, hot water storage tank, and hot water circulating pumps.



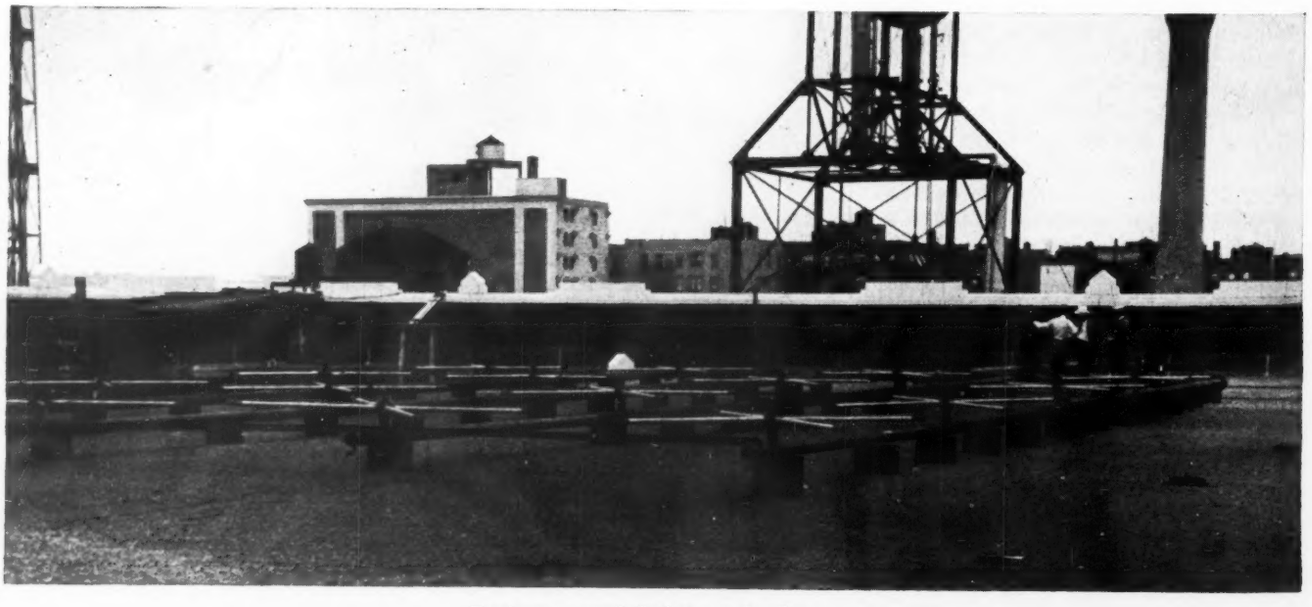
Control board in Grade B pasteurizing department, with instruments mounted, but switches still to be installed.


Brine cooler
Ammonia condenser
Ammonia condenser
Brine cooler
Brine cooler
Note: Ammonia receivers are located beneath ammonia condensers. Condenser and brine pumps on floor level under other equipment

Plan of ammonia condenser and brine cooler room.

Brine for milk cooling is carried in two complete separate systems, the principal one being held at 25 deg. F., the secondary system being held at 34 deg. F. Before explaining the operation of the two systems it should be pointed out that, in the pasteurizing department, regenerative heating and cooling is employed, thus minimizing the amount of heat or refrigeration needed at this point. Cold raw milk passing through the heat exchangers enters at a temperature of about 35 deg. F. and leaves the regeneration section at 122 deg. F. Hot pasteurized milk enters the regeneration section at 143 deg. F. and leaves at 65 deg. F., thus needing only 30 deg. of temperature to be removed by the brine in the cooling section of the heat exchanger.

Though the foregoing principle is easy enough to comprehend, its practical application is complicated by the necessity of allowing for interruptions. It is self-evident that stoppage of the flow of hot milk would quickly result in the milk freezing solid in the cold end of the heat exchanger—a serious problem that must be definitely eliminated. Hence, the existence of a secondary 34-deg. F. brine circulation system which is so designed that it will cut in automatically and maintain constant temperature of the outflowing cold milk whether it is moving or stopped.



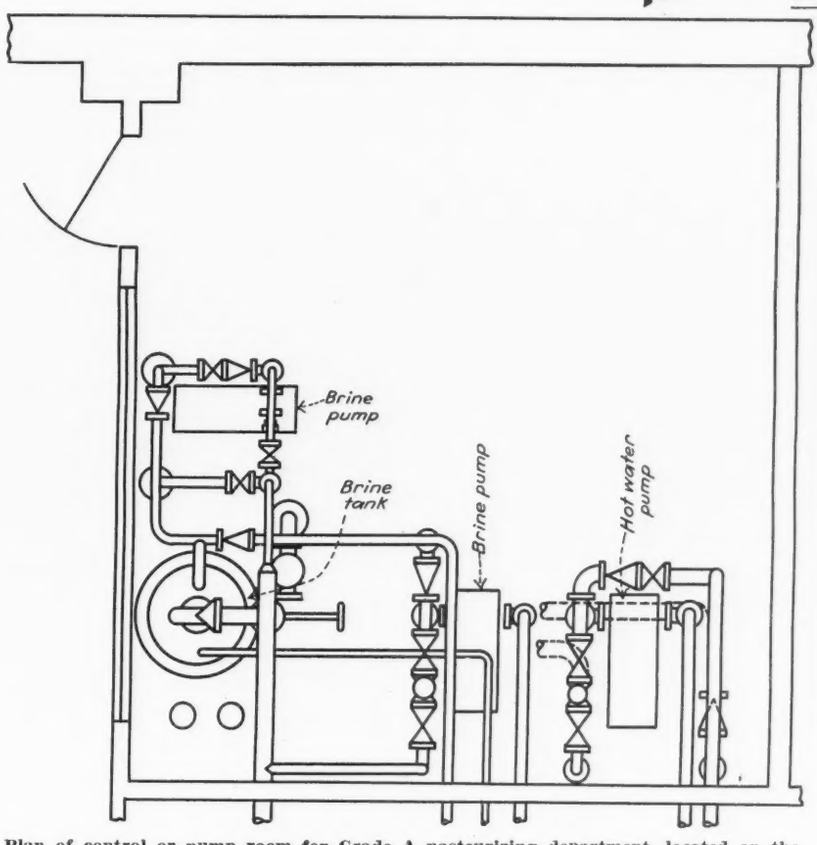
Roof spray pond during construction.

Compressed Air is Fully Cleaned.

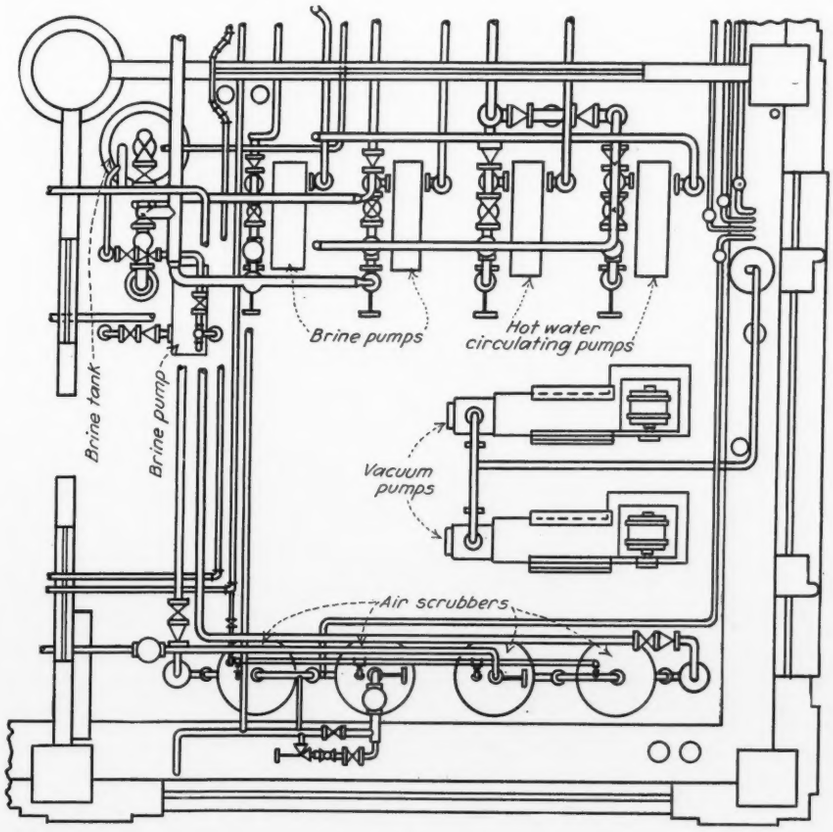
The compressed air is furnished by four compressors, two of the high pressure type delivering 80-lb. air for the bottle washers, and two furnishing 35 lb. air which is used mainly for handling milk throughout the plant and operating controllers. These compressors are all interconnected so that anyone of the four, or all four, can be operated on any one line.

Air from the compressors is first cooled, then passed through an oil separator. Next it is washed and then passes successively through two "air settling" tanks. It then passes through a final air filter before entering any air line. This method of obtaining clean sterile air has been used in other Borden plants with practically 100 per cent efficiency. Nevertheless, as an additional safeguard against bacteria, there is a dust filter on the intake of each compressor and a second filter in the air line at each point of application. Thus no bacteria can enter the milk from the air.

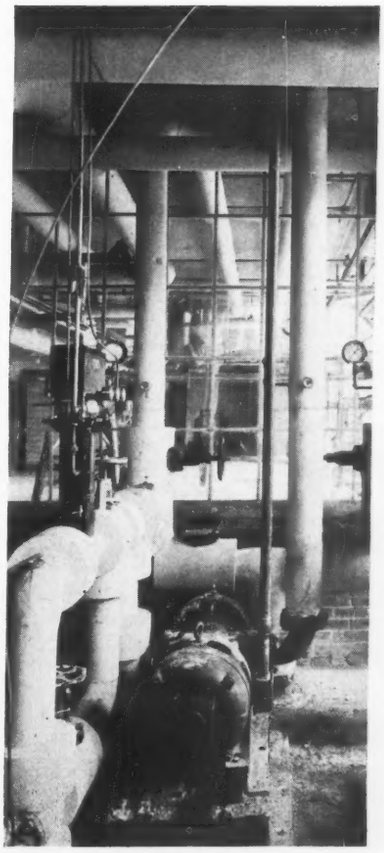
All these precautions are costly and require attention but are considered to be essentials in the proper handling of either Grade A or Grade B milk. And in this plant Grade B milk receives exactly the same careful handling that is given to Grade A milk.



Plan of control or pump room for Grade A pasteurizing department, located on the second or floor below, to keep operating floor clear.



Plan of control or pump room for Grade B pasteurizing department, located on the second or floor below.



One of the hot water circulating pumps in the Grade B control room.

Sales and Distribution Economies

By SAM C. SLAUGHTER

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BORDEN'S RIVERSIDE PLANT has been designed to effect economies in all phases of the distribution of milk. While many of these economies are realized in processing and other production activities, they are also possible in the sales department. This is true, not only from the company's standpoint, but also from that of the employee—in particular the route salesmen, who comprise in excess of 70 per cent of the sales personnel. To accomplish this two factors were given important consideration in the layout of the plant: (1) Economy of route salesmen's time in the plant, and to and from their routes, to permit a maximum of sales effort on routes, and (2) Employees' comfort and morale.

This plant is a consolidation of one wholesale and three retail branches. On a comparative basis, while a branch with 100 routes under one roof is recognized as a large unit, this plant operates a minimum of 110 horse and wagon routes, 178 motor vehicle routes, and 78 wholesale and store routes, or a total of 366. It is obvious that in an operation of this size everything possible must be done to save the time of the route salesmen. Economy may arise from the duties incident to his working day, both from the outside and inside of the plant. From the outside the principal source of time saving comes from the proper use of the proper route vehicle. Of the 178 retail motor vehicle routes, 166 were formerly horse and wagon routes. In moving to the new plant, the majority of these routes would have had to travel increased distances with a consequent lengthening of the route salesman's day, or a decrease in his time spent on the route. This was overcome largely by motorization. In a number of other cases, where proportionate savings could be made by transferring horse and wagon routes to nearer branches, this was done.

To ascertain which routes should be motorized and which should be sent to other branches as horse and wagon routes, several months in advance of the scheduled opening of Riverside the majority of the routes in the three retail branches consolidated were studied by trained observers who rode with each routeman and obtained the time necessary to carry out his daily activities. Each route was then projected into the Riverside plant and where the traveling time during the day was calculated to be such as to reduce the delivery hours and accordingly the routeman's sales and commissions, or to penalize the routeman by a longer working day, the route was either motorized or transferred to a less distant branch.

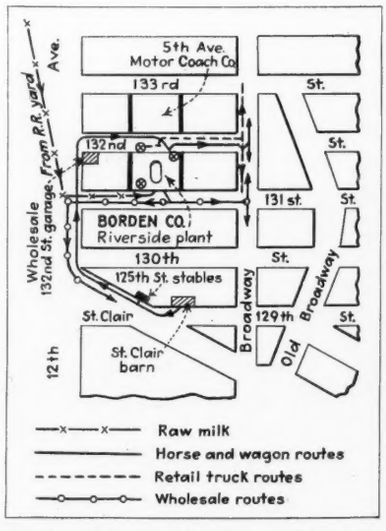
The survey incident to the motorization program showed definitely that frequently as much as 10 per cent of a routeman's day may be spent waiting for his load in the morning and placing it in his vehicle. Naturally this causes him to be dissatisfied and affects his sales. To overcome this possibility a definite time schedule has been established for the arrival of both horse and wagon routes and motorized routes at the loading platform. In order that they will not arrive too early and therefore create a long waiting line, dispatchers at the barn and garage release them according to a schedule which allows them to arrive at the loading platform according to the loading schedule. Since the horses and wagons are stabled several blocks from the plant, it is necessary to route them to the plant in order to save time. This is not a problem with the motor vehicle routes since their vehicles are garaged in the building where they receive their products.

Here, however, in order to prevent any traffic confusion, all motor vehicles are stored in the order in which they depart for the loading platform. All traffic is down on the ramps during loading hours and up at all other times.

The movement of vehicles is controlled by automatically operated red and green traffic lights. This system is an adaptation of the railroad block signal control. A descending vehicle on clearing the "block" trips the automatic device which gives the green "go" signal to the following vehicle. When this vehicle enters the "block" the green signal is tripped to red. This occurs from floor to floor until all vehicles are out. Since the loading schedule calls for a maximum of eight motor vehicle routes and seven horse and wagon routes during any one ten-minute interval, there will be a uniform flow of traffic to and from the loading platform. This desire to avoid congestion has been carried so far as to designate the streets the routes should take in getting away from the plant, as well as to set up a working arrangement with the Fifth Avenue Motor Coach Co. which has some of its busses leaving via West 132d Street, so that the traffic movement of both companies' vehicles will be coordinated.

As raw milk is unloaded from tank trucks to storage tanks on the first floor where the wholesale routes and trailers for transporting milk to branches are also loaded, it is easy to appreciate the necessity for a closely coordinated movement of all vehicles. Otherwise the drivers of such vehicles would also be penalized by an increase in nonproductive working time. As a result of the highly developed organization just described it is expected that just as savings in processing and transportation costs can be measured in actual money value, savings in the routeman's time will be reflected in better collections and increased sales.

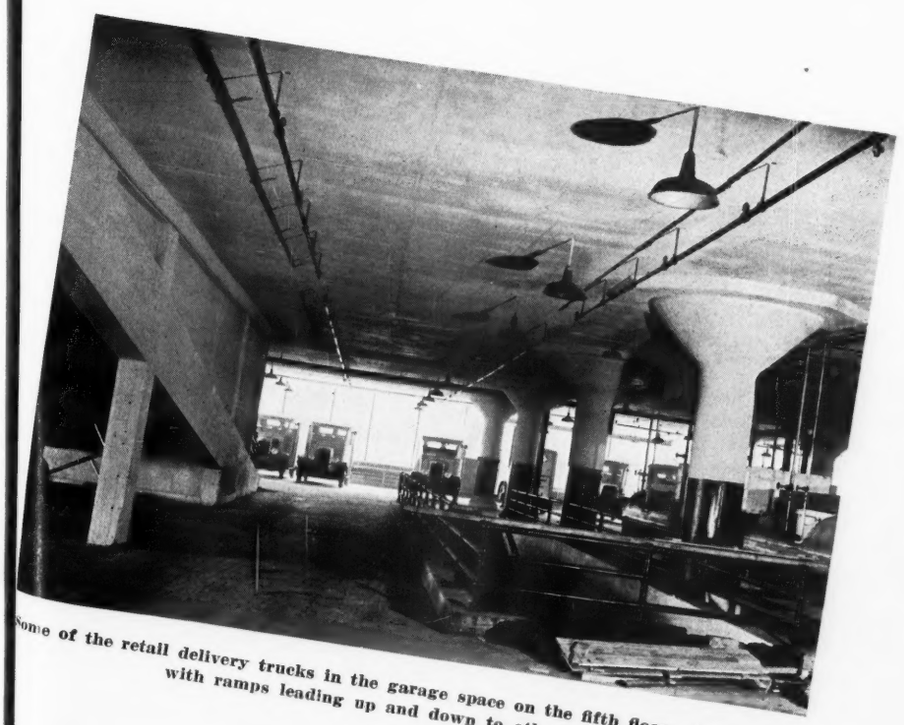
Increased efficiency, employee comfort and morale come from consideration given to details of employees' ac-



Street plan in vicinity of Riverside plant, showing routing of trucks and horse drawn vehicles.

...at Riverside

As vehicles of the Fifth Avenue Coach Co. enter and leave the entrance markd "1" on this photograph, it is necessary for Borden vehicles, which use the Riverside plant entrances marked "2," to operate on a schedule that is coordinated with that of the motorbusses.



Some of the retail delivery trucks in the garage space on the fifth floor of Riverside, with ramps leading up and down to other floors.

tivities within the plant. Some of the routeman's time is naturally taken up in "checking in" or accounting for his daily sales. To facilitate this work and accompanying activities, there are fifteen contact areas conveniently located between the route salesmen's make-up rooms and the general office. Five of these points constitute cashiers offices. The lay-out of these positions has been planned to eliminate lost motion and concentration at any one point, and to provide the rapid handling and dispatching essential to the fluid milk business. From all of these points, route salesmen's activities are "checked in" daily. Wholesale and retail "checking in" facilities are separately maintained, although adjacent to each other, and are equally well organized to save time.

For convenience, comfort and efficiency the route salesmen's make-up quarters are air conditioned and spacious. These quarters are also equipped with long work tables and benches, and a full complement of cafeteria equipment for dispensing free coffee and rolls to the route salesmen. Contribut-

ing further to comfort are air-conditioned locker rooms, showers and clean uniforms and towels.

To conserve time and contribute towards the morale of the routemen, the sales supervisors and their assistants are always accessible to the men under their jurisdiction. Each of these supervisors has charge of 30 routemen, who report to him regularly concerning sales credit and collection problems, as well as any other problems which may arise during the day. Accordingly, he is an important part of the smooth functioning milk sales organization and in keeping with his duties he has an office at the head of the make-up table for his group of route salesmen. He and his assistants are also located in the make-up room to facilitate the reporting of each route salesmen's daily progress. This supervision is supplemented by charts and bulletin boards accessible to the sales organization and split up between sections to portray group performance. These convenient facilities enable the sales management to maintain proper and immediate contact with route salesmen.

The training of employees was undertaken in three phases prior to the opening of the plant. The first of these had to do with the instruction of horse and wagon routemen as drivers of motor vehicles. This had been going on for several months before the opening of the plant, and before a man was allowed to handle a vehicle himself on his route it was necessary for him to pass company as well as state requirements. In order that he would be familiar with driving conditions within the plant, particularly in ascending and descending the ramps, each man was trained and given experience in doing this before the plant opened. As a result, even though a large number of formerly "green" drivers were placed on vehicles they have quickly become accustomed to these vehicles and have demonstrated that the careful training given to them was well worthwhile.

The second phase of training was to familiarize all routemen and others involved with the entire plant and all the activities concerned with the production and distribution of the products sold by them to the ultimate consumer. This phase of training was combined with entertainment, taking the form of a dinner and amusement program, at which employees' wives and other relatives were present. After this entertainment, the entire group was conducted through the plant, and where a detail of operation particularly affected the route salesmen they were given specific instructions.

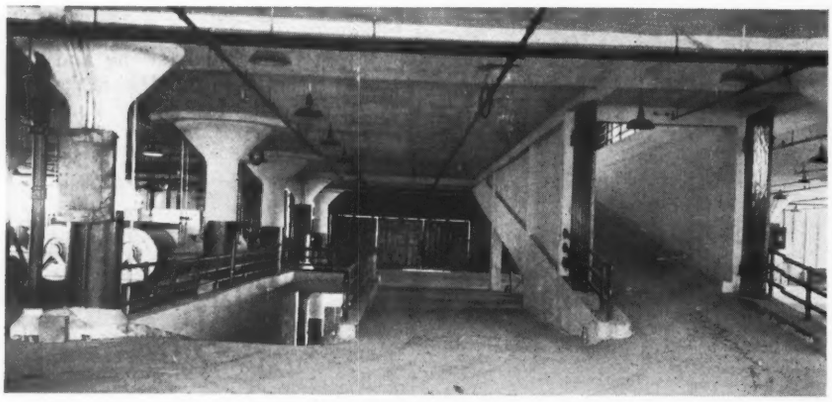
The third phase of training to help routemen become better salesmen was an intensification of the training plan already in effect. The keystone of this plan is the "sales supervisors' council." Every supervisor is a member and receives regular instructions in sales methods by use of statistics, practical discussions, and sound films. This instruction and information is passed on to the 30 route salesmen under each supervisor either in the same manner he received it or at the make-up table while the men "check in" each day. At the same time the supervisor can solve any problems which are brought to him during the day by his men as a result of his training. Also, under the jurisdiction of the supervisors are five junior foremen, each of whom has charge of six of the 30 routes mentioned. While these junior foremen deliver a different route each day so that the regular driver has a day off, they also are responsible for carrying the sales program to their group.

Riverside lends itself to favorable publicity. Supplementing that already begun by the original tour of employees' and relatives will be regularly conducted inspection tours. At other Borden branches, approximately a thousand people a month are learning how a large milk distributing company operates. As usual, schools, clubs, organizations and other groups will be invited to inspect the plant and will be in the care of trained guides. The courtesy of these tours, made more pleasant by dairy products refreshments, will be extended to more than 5,000 visitors per month.

The remainder of the publicity plans for announcing the opening of Riverside will probably include time on WOR's "Let's Visit" program, as well as broadcasts by public officials on the formal opening date, Sept. 15. The plans further include an institutional rotogravure spread in newspapers coincident with the formal opening.

Since building, remodeling or consolidation of existing plants usually involves junking of capital assets with a consequent loss, and an increase in capital investments, these must be justified by lowered operating costs. It is expected that these economies will be obtained in Riverside chiefly through a reduction in the processing cost per unit of product, and the elimination of transportation costs of finished products to the plants consolidated. Supplementing these will be the savings brought about through better utilization of sales efforts.

One of the trucks used on retail delivery routes.



Up to the sixth floor, down to the fourth.